Adam Weishaupt was a look-alike for George Washington, and it is actually Weishaupt's image that appears on the one-dollar bill. Johann Adam Weishaupt was a German philosopher and founder of the Order of the Illuminati, a secret society.

Exploring PCR

Explore PCR Applications

- Mutagenesis
- Cloning
- Sequencing
- Genotyping
- Gene Expression
- Pathogen Detection
- Multiplexing

10^9 copies of DNA are made after 30 cycles of PCR in 1 reaction.

Explore different types of PCR

1 Quantitative PCR

- **84% of researchers** doing qPCR use a Hot-Start DNA Polymerase.
- **79.1% analyze qPCR** data by the Standard Curve Method.
- **41.2% use** pre-developed assays.

Probe-Based Chemistries **VS** SYBR™ Technology-Based Chemistries

2 Fast PCR

Thermo Scientific™ Phire™ Polymerase can amplify a 1.5 Kb DNA fragment in **30 minutes.**

30 minutes

3 Reverse Transcription PCR

- Reverse Transcriptases are the replicating enzymes of retroviruses.
- **RT-PCR** can happen in a **1-step assay** or a **2-step assay.**

RNA Template → cDNA → PCR

4 High-Fidelity PCR

Thermo Scientific™ Phusion™ High Fidelity Polymerase is **52x more** accurate than *Taq* Polymerase.

$$\frac{1}{\text{polymerase error rate}} = \text{Fidelity}$$

5 Direct PCR

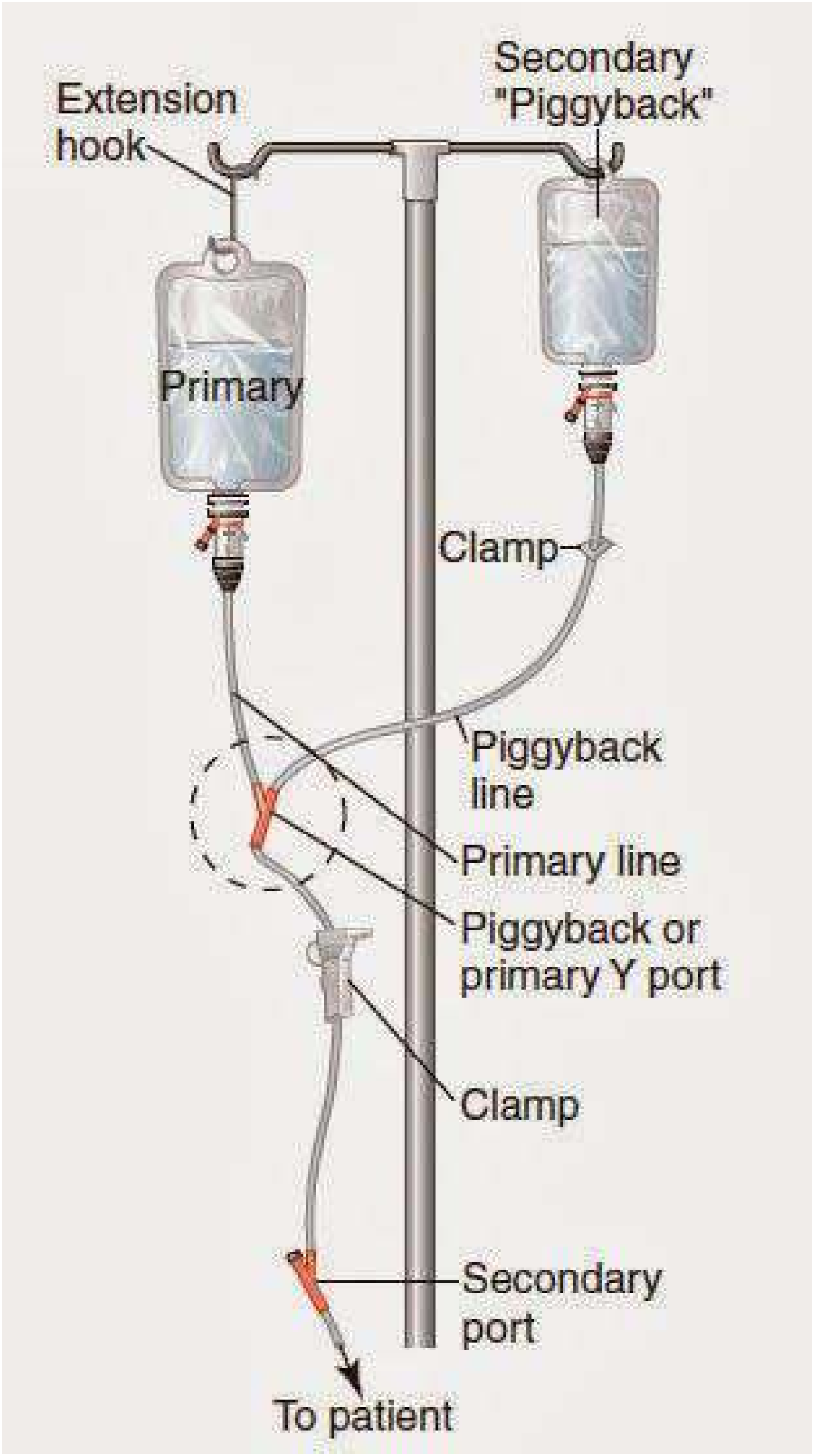
No DNA purification necessary! Tissue sample goes straight into **PCR** tube.

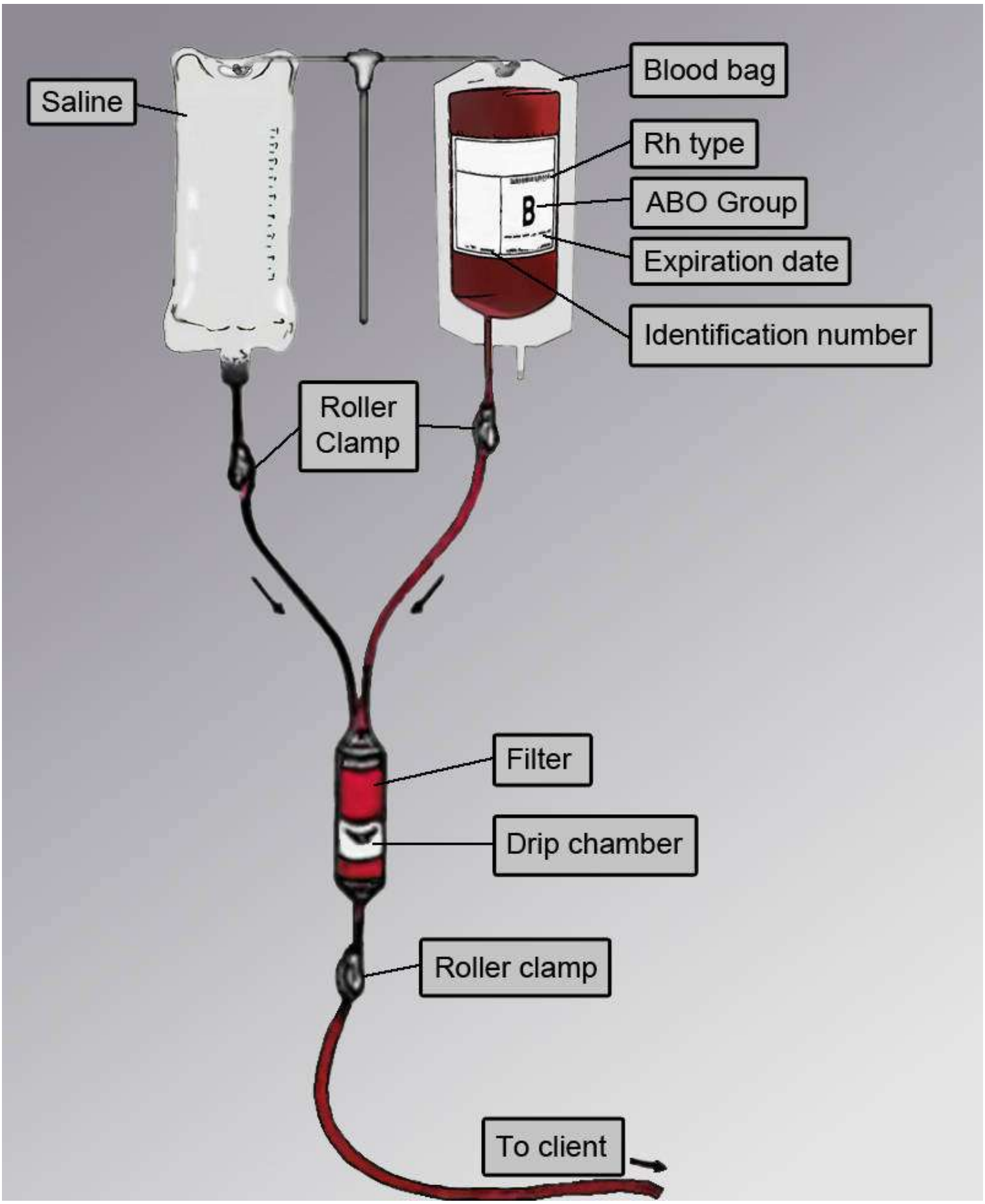
1985 **PCR** published in the Journal of Science.

1989 **TAQ** Polymerase is named "Molecule of the Year" by the Journal of Science.

thermoscientific.com/onebio

Thermo SCIENTIFIC


Extension hook
Secondary "Piggyback"
Primary
Clamp
Piggyback line
Primary line
Piggyback or primary Y port
Clamp
Secondary port
To patient


Saline
Blood bag
Rh type
B
ABO Group
Expiration date
Identification number
Roller Clamp
Filter
Drip chamber
Roller clamp
To client

General Blood Type Distribution

- **O Rh-positive, 38%**
- **O Rh-negative, 7%**
- **A Rh-positive, 34%**
- **A Rh-negative, 6%**
- **B Rh-positive, 9%**
- **B Rh-negative, 2%**
- **AB Rh-positive, 3%**
- **AB Rh-negative, 1%**

❖ **Percentages of blood types vary by race; these are avg. % for all races combined**

What is Bombay blood group?

To understand Bombay blood group we must understand the details of blood grouping. When we say someone has blood group A, it means that the person has antigen of type 'A' and antibody of type 'B' in his/her blood. People with AB have both antigen A and B in their blood and no antibodies. People with O blood group have only antibodies A and B and no antigens. However what is not generally known is that all these groups have an antigen H in the blood as well. There are very few people who do not have this antigen H also in their blood. Instead they have antibody H because of which no other blood can be given to them.

Blood Groups (Antigens and Antibodies)		
Blood Group	**Antigens**	**Antibodies**
A	A,H	B
B	B,H	A
AB	A,B,H	-
O	H	A,B
Bombay Blood Group	-	A,B,H

About Bombay Blood Group

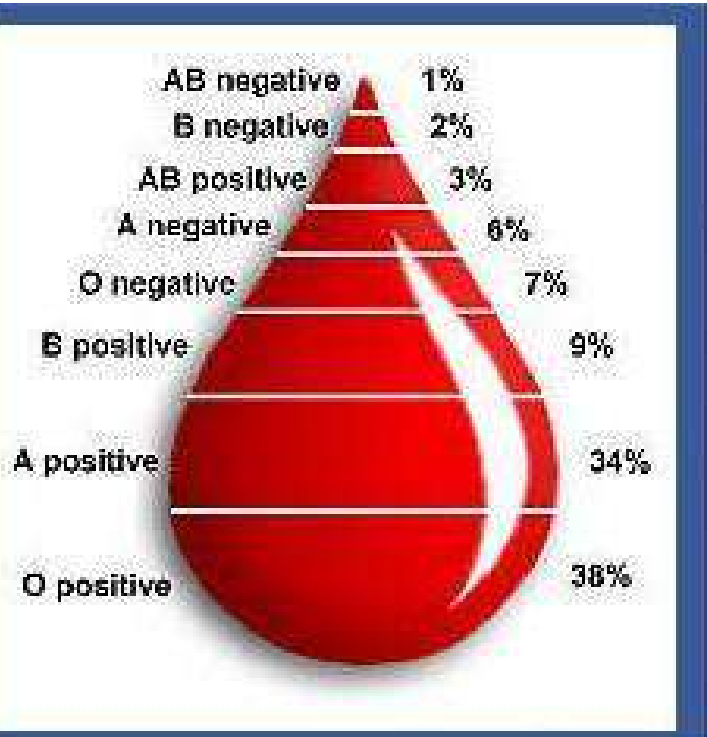
Most of us are not aware about such blood group's existence on this planet. Bombay blood group is named so because the first case was found in Bombay (now Mumbai), the financial capital of India.[1] This group is commonly mistaken as "O" group and many times not identified at all because of lack of necessary technology in blood banks. Bombay blood group differs from O blood group by lacking H antigen on RBCs. It could be Rh positive or Rh negative.[2]It's one of the rarest blood groups in India as well as world. 1 in every 17600 people in India or 1 in every 25000 people in the world has this blood group.[3] We Indian are lucky as the frequency is more here with respect to the world. It is believed that this blood group resulted from gene mutation in Indian population and slowly was spread all over the world. City like Mumbai has got only 35-40 blood donors with this blood group. [4] Totally 179 people are known to have Bombay Blood group in India. [6]

What is Bombay Blood Group?

To understand Bombay Blood Group we must understand the details of blood grouping. When we say someone has blood group A, it means that the person has antigen of type 'A' and antibody of type 'B' in his/her blood. People with AB have both antigen A and B in their blood and no antibodies. People with O blood group have only antibodies A and B and no antigens. However what is not generally known is that all these groups have an antigen H on in the blood as well. There are very few people who do not have this antigen H also in their blood. Instead they have antibody H because of which no other blood can be given to them.

Blood Groups(Antigens and Antibodies)

Blood Group	Antigens	Antibodies
A	A,H	B
B	B,H	A
AB	A,B,H	-
O	H	A,B
Bombay Blood Group	-	A,B,H

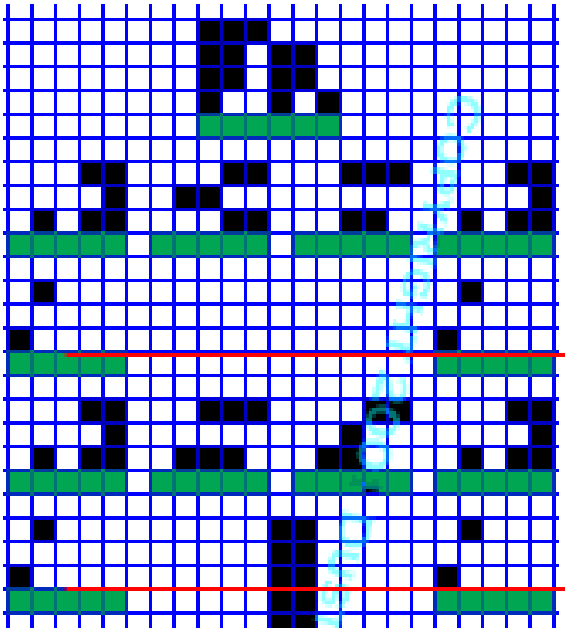


If Your Blood Type Is...

Type	You Can Give Blood To	You Can Receive From
A+	A+ AB+	A+ A- O+ O-
O+	O+ A+ B+ AB+	O+ O-
B+	B+ AB+	B+ B- O+ O-
AB+	AB+	Everyone
A-	A+ A- AB+ AB-	A- O-
O-	Everyone	O-
B-	B+ B- AB+ AB-	B- O-
AB-	AB+ AB-	AB- A- B- O-

"If mankind evolved from the same African ancestor then everyone's blood would be compatible, but it is not. Where did the Rh- negatives come from? Why does the body of an Rh- negative mother carrying an Rh+ positive child try to reject her own offspring? Humanity isn't one race, but a hybrid species."

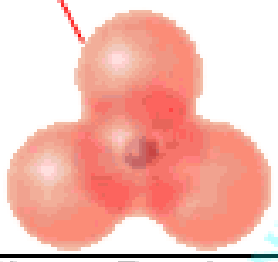
Species with Amnesia: Our Forgotten History by ROBERT SEPEHR



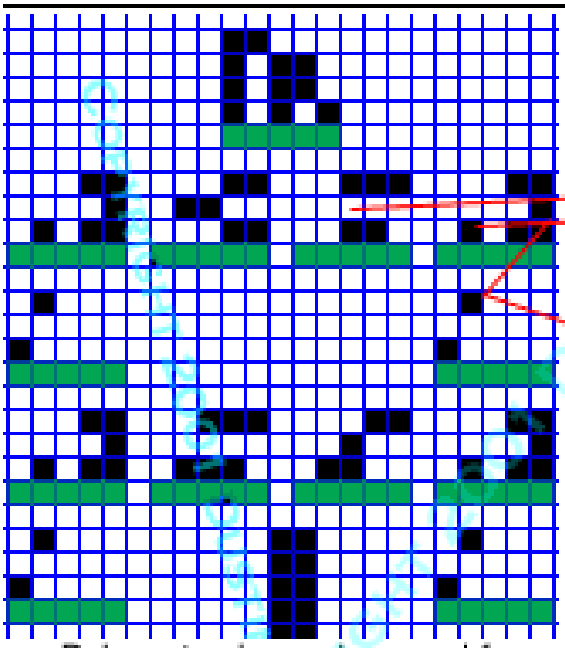
Alien Template, Chilbolton 2001

GREEN Marker blocks in Atomic Number Grid dictate how to calculate below Molecular Structure

Moving from top to bottom and right to left for each green marker block, we have Atomic Numbers 1 = Hydrogen; 6 = Carbon; 7 = Nitrogen; 8 = Oxygen; 14 = Silicon; 15 = Phosphorus



Silicon Oxygen 4 (SiO4) Tetrahedron replaces Phosphate (PO4) in Alien DNA between Deoxyribose creating Hydrogen Oxygen Bonds.

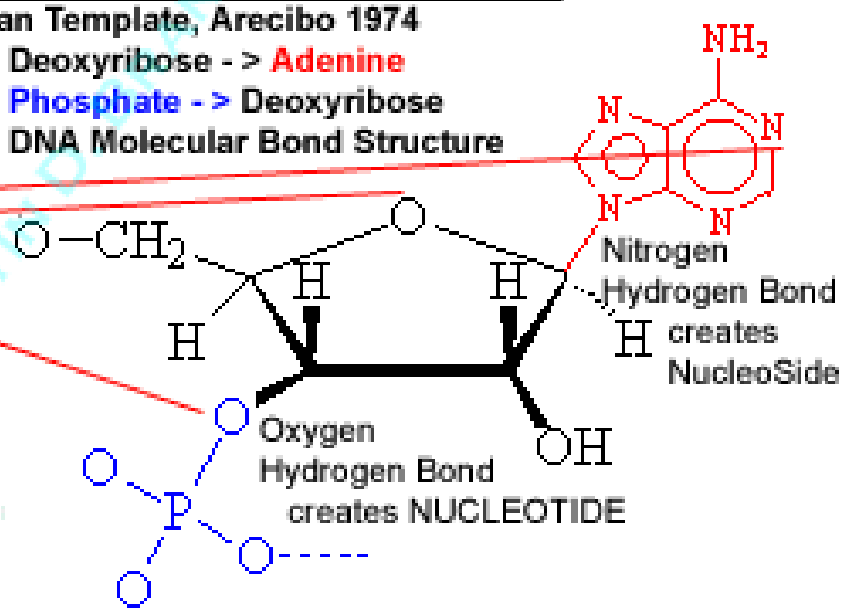


Human Template, Arecibo 1974

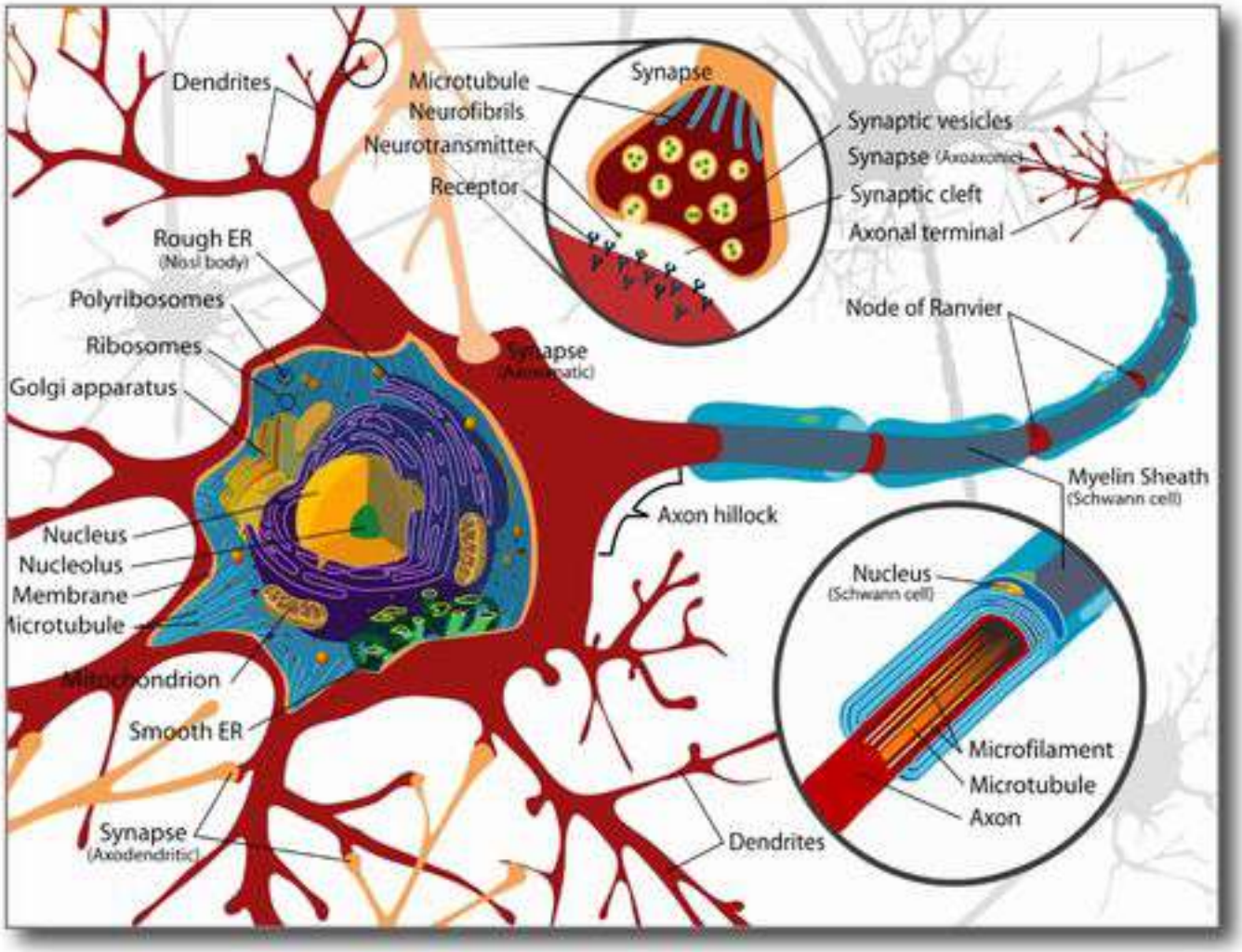
Deoxyribose - > Adenine

Phosphate - > Deoxyribose

DNA Molecular Bond Structure



Below atomic numbers and from right to left, we read the molecular structure as follows. Deoxyribose (formula H7 C5 O), Adenine (formula H4 C5 N5), Thymine (formula H5 C5 O5 N2), Deoxyribose, Phosphate (formula P O4), Phosphate, Deoxribose, Cytosine (H4 C4 N3 O); Guanine (formula H4 C5 N5 O), Deoxyribose, Phosphate, Phosphate. We deliberately show - 3 Hydrogen in the formula for Deoxyribose, and -1 Hydrogen Atom for each Nitrogen Base to indicate the complete molecular structure and the hydrogen bonds between each of them.



Modern Neurons Style *by Wonderful12345*

Zazzle

How DNA works

The defining moment for DNA was the discovery of its structure in 1953. Main functions of DNA, the genetic material that forms chromosomes in a cell nucleus:

Human cell nucleus
Contains 46 chromosomes

Chromosome
When unraveled it consists of double-stranded DNA

DNA
Held together by four chemicals called bases:

Sections of DNA form genes; these contain instructions for making the proteins needed for the body to grow and maintain itself

A: Adenine — **T:** Thymine

C: Cytosine — **G:** Guanine

Where one strand has "A", the other must have "T"; where one has "C", the other must have "G"

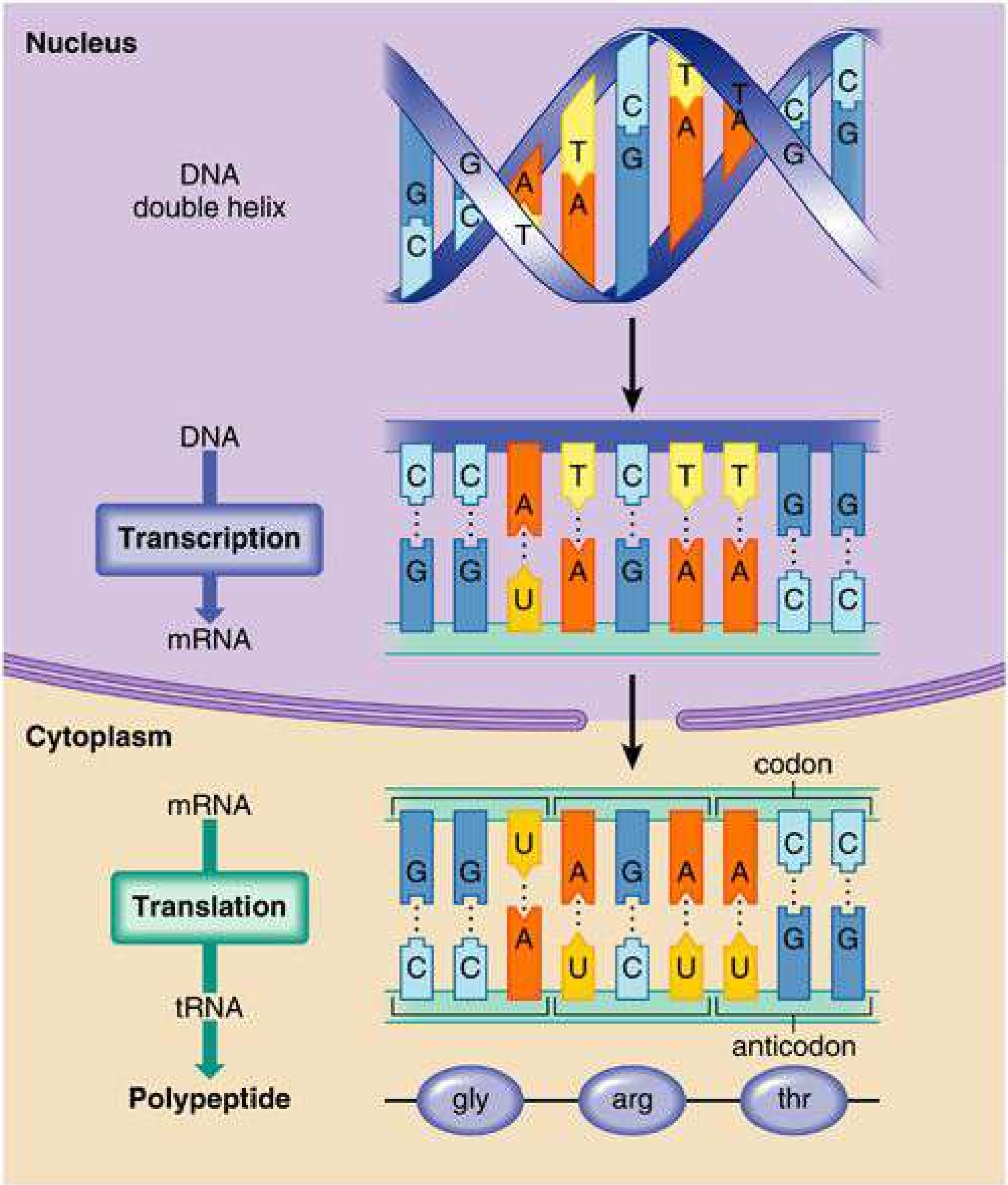
Cell splits
When cell splits to make two cells, strands of DNA come apart

Spare bases

Spare bases

Double helix form
Spare free-floating bases form within the cell are added to the open strands to turn each strand into a full double helix again

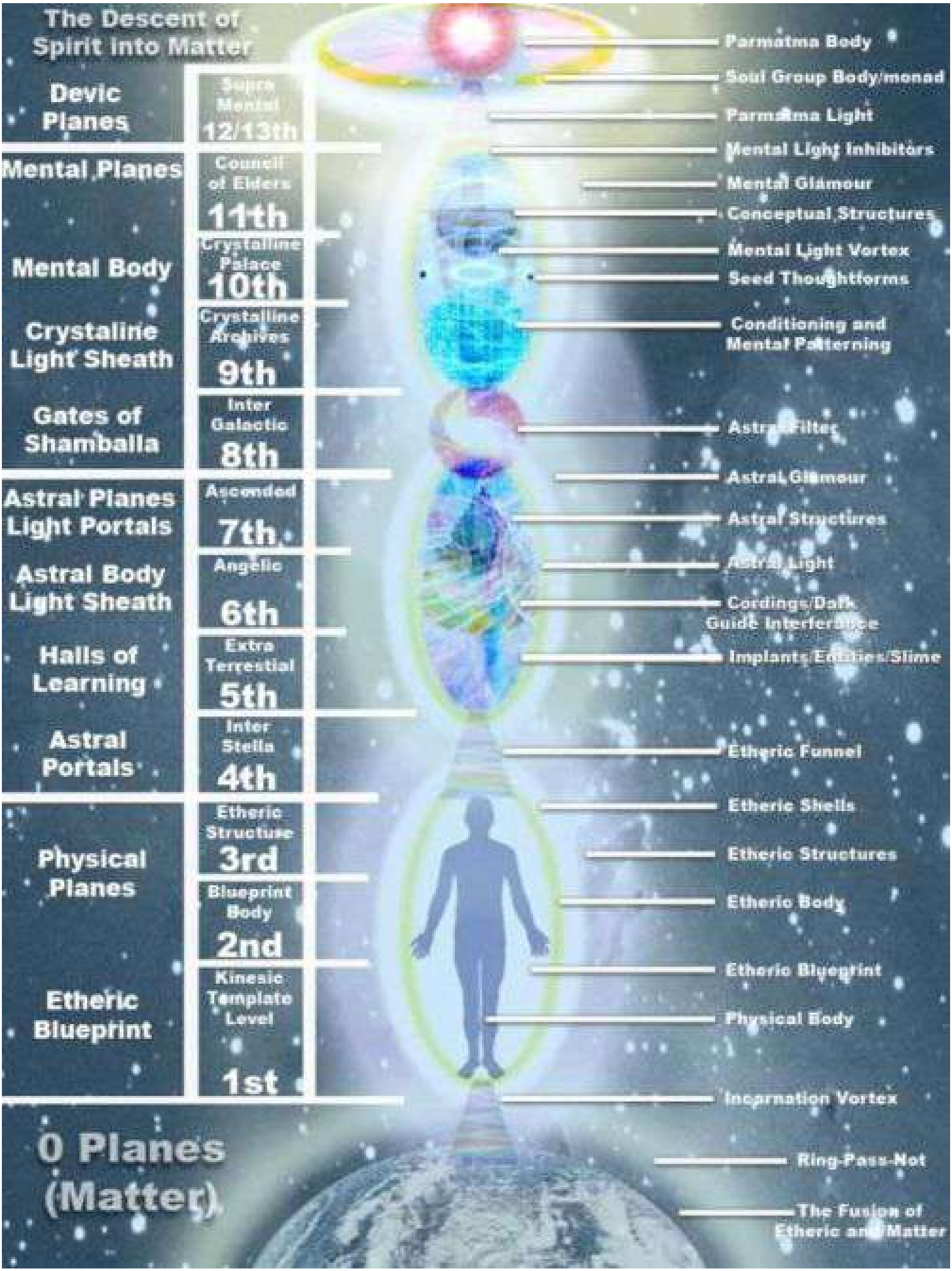
Source: Illustrated Guide to the Human Body
Graphic: Elsebeth Nielsen, Morten Lyhne



Spinal Nerve Function

Every Cell of Your Body Has a Nerve Component

VERTEBRAL LEVEL	NERVE ROOT*	INNERVATION	POSSIBLE SYMPTOMS
C1	C1	Intracranial Blood Vessels • Eyes • Lacrimal Gland • Parotid Gland • Scalp • Base of Skull • Neck Muscles • Diaphragm	Headaches • Migraine Headaches • Dizziness • Sinus Problems • Allergies • Head Colds • Fatigue • Vision Problems • Runny Nose • Sore Throat • Stiff Neck • Cough • Croup • Arm Pain • Hand and Finger Numbness or Tingling • Asthma • Heart Conditions • High Blood Pressure
C2	C2		
C3	C3		
C4	C4		
C5	C5	• Neck Muscles • Shoulders • Elbows • Arms • Wrists • Hands • Fingers • Esophagus • Heart • Lungs • Chest	
C6	C6		
C7	C7		
	C8		
T1	T1	Arms • Esophagus • Heart • Lungs • Chest • Larynx • Trachea	Wrist, Hand and Finger Numbness or Pain • Middle Back Pain • Congestion • Difficulty Breathing • Asthma • High Blood Pressure • Heart Conditions • Bronchitis • Pneumonia • Gallbladder Conditions • Jaundice • Liver Conditions • Stomach Problems • Ulcers • Gastritis • Kidney Problems
T2	T2		
T3	T3		
T4	T4		
T5	T5	Gallbladder • Liver • Diaphragm • Stomach • Pancreas • Spleen • Kidneys • Small Intestine • Appendix • Adrenals	
T6	T6		
T7	T7		
T8	T8		
T9	T9		
T10	T10		
T11	T11	Small Intestines • Colon • Uterus	
T12	T12	Uterus • Colon • Buttocks	
L1	L1	Large Intestines • Buttocks • Groin • Reproductive Organs • Colon • Thighs • Knees • Legs • Feet	Constipation • Colitis • Diarrhea • Gas Pain • Irritable Bowel • Bladder Problems • Menstrual Problems • Low Back Pain • Pain or Numbness in Legs
L2	L2		
L3	L3		
L4	L4		
L5	L5		
	SACRAL	Buttocks • Reproductive Organs • Bladder • Prostate Gland • Legs • Ankles • Feet • Toes	Constipation • Diarrhea • Bladder Problems • Menstrual Problems • Lower Back Pain • Pain or Numbness in Legs


The Descent of Spirit into Matter
Devic Planes
Supra Mental 12/13th
Mental Planes
Mental Body
Council of Elders 11th
Crystalline Palace 10th
Crystaline Light Sheath
Crystalline Archives 9th
Gates of Shamballa
Inter Galactic 8th
Astral Planes Light Portals
Astral Body Light Sheath
Ascended 7th
Angelic 6th
Halls of Learning
Extra Terrestial 5th
Astral Portals
Inter Stella 4th
Physical Planes
Etheric Blueprint
Etheric Structure 3rd
Blueprint Body 2nd
Kinesic Template Level 1st
0 Planes (Matter)
Parmatma Body
Soul Group Body/monad
Parmatma Light
Mental Light Inhibitors
Mental Glamour
Conceptual Structures
Mental Light Vortex
Seed Thoughtforms
Conditioning and Mental Patterning
Astral Filter
Astral Glamour
Astral Structures
Astral Light
Cordings/Dark Guide Interference
Implants/Entities/Slime
Etheric Funnel
Etheric Shells
Etheric Structures
Etheric Body
Etheric Blueprint
Physical Body
Incarnation Vortex
Ring-Pass-Not
The Fusion of Etheric and Matter

22 Chakras Chart

www.paulawratten.com

Chakras 16-22
are 5th Dimensional

Chakra Colours	Chakra Numbers
Platinum	Twenty Second Chakra
Blue Gold	Twenty First Chakra
Voilet Gold	Twentieth Chakra
Magenta	Nineteenth Chakra
Pink Gold	Eigthteenth Chakra
Multi - White	Seventeenth Chakra
Light Voilet White	Sixteenth Chakra

Chakras 8-15
are 4th Dimensional

Chakra Colours	Chakra Numbers
Light Golden White	Fifteenth Chakra
Deep Blue Voilet	Fourteenth Chakra
Voilet Pink	Thirteenth Chakra
Shimmering Gold	Twelfth Chakra
Pink Orange	Eleventh Chakra
Pearlescen	Tenth Chakra
Blue Green	Nineth Chakra
Seafoam Green	Eighth Chakra

Chakras 1-7
are 3rd Dimensional

Chakra Colours	Chakra Sounds	Chakra Numbers
Voilet	Aum	Crown Chakra
Indigo	Om	
Blue	Ham	Throat Chakra
Green	Yam	Heart Chakra
Yellow	Ram	Solar Plexus Chakra
Orange	Yam	Polarity Chakra
Red	Lam	Root Chakra

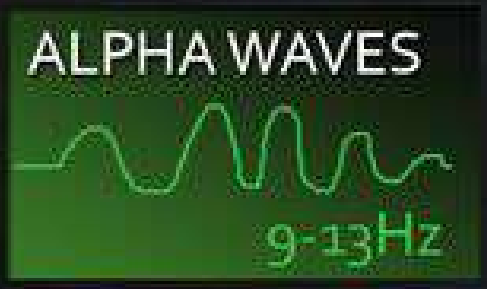
Dimensions


THE MAIN SIX SOLFEGGIO FREQUENCIES
396 hz
LIBERATING GUILT & FEAR
417 hz
UNDOING SITUATIONS & FACILITATING CHANGE
528 hz
TRANSFORMATION & MIRACLES (DNA REPAIR)
639 hz
CONNECTING/RELATIONSHIPS
741 hz
EXPRESSION/SOLUTIONS
852 hz
RETURNING TO SPIRITUAL ORDER

GET TO KNOW YOUR BRAINWAVES

HIGH BRAIN ACTIVITY
GREAT FOR LEARNING & DRIVING

ENGAGED AND BUSY
GOOD FOR CHATTING AND SURFING THE WEB.



VERY CHILL
GREAT FOR SLIDING INTO MEDITATION AND MINDFULNESS

DROWSY AND SLEEPY
GOOD FOR NIGHT AND SLEEP

BLACKOUT

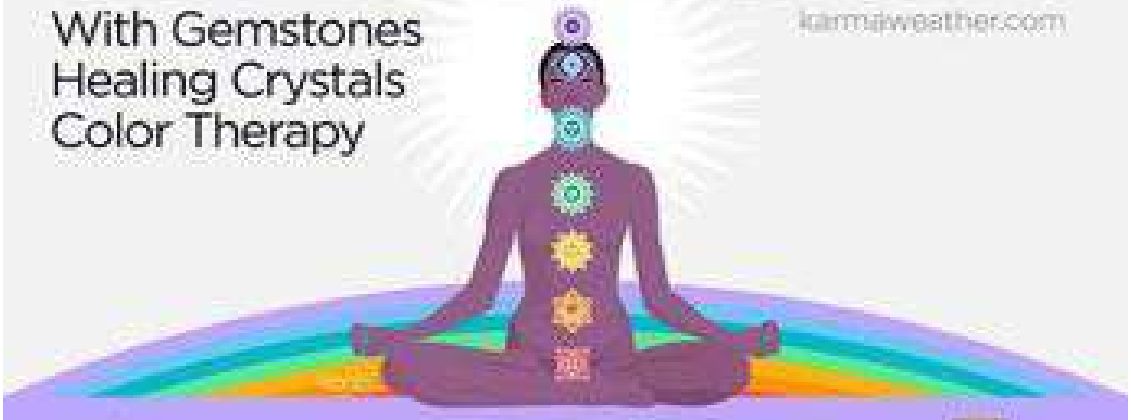
PRACTICING MINDFULNESS

WWW.PRACTICINGMINDFULNESS.COM

CHAKRA BALANCING

With Gemstones
Healing Crystals
Color Therapy

karmaweather.com



CROWN


Diamond


Clear Quartz


Gold

THIRD EYE


Lapis Lazuli


Amethyst


Purple Fluorite

THROAT


Turquoise


Aquamarine


Azurite

HEART


Malachite


Emerald


Pink Quartz

SOLAR PLEXUS


Yellow Citrine


Chrysoberyl


Golden Rutilated Quartz

SACRAL


Citrine


Carnelian


Silver Rutilated Quartz

ROOT


Fire Agate


Tiger's Eye


Hematite

KarmaWeather

Violet Flame in Reiki Healing

Request Archangel Michael to protect you. You may say, "Dear Archangel Michael, as I prepare to do this healing work, please surround me in your golden light and protect me. Thank you".

Call upon Archangel Raphael. You may say, "Dear Archangel Raphael, please help me to remove and clear these blocks from my (or client's) energy field. Thank you".

Call upon Saint Germain. You can say, "Dear Ascended Master, Saint Germain, please help me work and heal using the power of the violet flame. Thank you".

Take three deep breaths and prepare yourself for the healing.

Invoke the Violet Flame. "Dear Violet Flame, please receive all these blocks that I am going to pour into you and transmute them into pure divine light." Imagine a violet fire burning in front of you.

Open up the fingers of your hand/hands. You may imagine them being extended so they can reach the block easily.

Sense the energetic block in the body and start scooping it out with your fingers.

As you scoop it out pour the energetic debris into the violet flame. As you pour the debris into the violet flame, you can visualize it being transmuted into light.

Once you decide to stop, express your gratitude to the Violet Flame and to Saint Germain.

Now visualize the violet flame turning off. If you are using a candle, put it off.

Proceed to do a full body healing with Reiki, paying particular attention to the area that was treated with the violet flame. While treating that area, visualize it being flooded with Reiki. Also, visualize it being whole and healed.

Once you are done with the full body healing, express your gratitude to Reiki, Archangel Michael and Archangel Raphael. Drink lots of water and relax.

Article by Haripriya Suraj

Chakra Cleansing & Balancing Mudras & Mantras

While SEATED in Easy Pose (Cross-Legged on the Floor), VISUALIZE the CHAKRA LOCATION: its COLOUR and REPEAT the MANTRA for 3 MINUTES for EACH CHAKRA: beginning with Root Chakra...

CHAKRA NAMES, PURPOSE & LOCATION	MUDRA	PROCEDURE	MANTRA & CHAKRA COLOUR	CHAKRA SYMBOL
1. **ROOT CHAKRA** **MULADHARA** (SURVIVAL) Base of Spine, on Perineum.		Thumb & Index fingers touch. Arms Straight, hands on knees. Chakra Sound... Long L-A-A-A-A-M.	**LAM**	
2. **SACRAL CHAKRA** **SWADHISTHANA** (CREATIVITY) Hips		Place Hands in your lap with your palms facing upwards, right palm resting on top of left. Chakra Sound... Long V-A-A-A-A-M.	**VAM**	
3. **SOLAR PLEXUS CHAKRA** **MANIPURA** (WILL POWER) Two-Inches Below Naval		Place Hands between your heart and your stomach. Chakra Sound... Long R-A-A-A-A-M.	**RAM**	
4. **HEART CHAKRA** **ANAHATA** (LOVE) Heart		Right Hand: Index finger and thumb touching at Heart Centre. Left Hand in same Mudra resting on the Knee. Chakra Sound... Long Y-A-A-A-A-M.	**YAM**	
5. **THROAT CHAKRA** **VISHUDDA** (EXPRESSION) Throat		Hands by Stomach, fingers interlaced and thumb tips touching. Focus on Throat Chakra. Chakra Sound... Long H-A-A-A-A-M.	**HAM**	
6. **THIRD EYE CHAKRA** **AJNA** (INTUITION, WISDOM) Third Eye		Hands in front of the lower part of your breast, Middle fingers stand up tips touching, other fingers bent at first joint as shown. Chakra Sound... Long A-A-A-U-U-M.	**AUM**	
7. **CROWN CHAKRA** **SAHASRARA** (SPIRITUAL CONNECTION) Crown		Hands in front of your stomach, fingers interlaced, Little fingers pointing upwards. Chakra Sound... Long A-A-A-A-N-G.	**ANG**	

MEDITATION AND BRAINWAVES

Meditation has used for thousands of years, but only in the last few decades has science begun to uncover the many benefits of meditation using sophisticated tools like neuro-imaging, functional magnetic resonance imaging, brain mapping technology, and gene research, thus allowing scientists an unprecedented ability to measure the effects of meditation on the brain and brainwave patterns.

14-24hz Beta Waves

Beta brainwave frequencies occur in the range from 14 - 24 Hz and correspond to the typical "busy mind" experience common to most of us. The Beta frequency range is characterized by a chaotic, fragmented, unbalanced thinking typical of left brain dominance, commonly referred to as the "monkey mind."

8-13hz Alpha Waves

The beginning of balanced brainwave activity occurs in the Alpha frequency range between 8 -13 Hz. The more alpha waves that a person is able to produce in ordinary states of consciousness, the easier it is for them to access deeper meditative states.

4-7.5hz Theta Waves

In the Theta frequency range between 3.5 - 7 Hz balanced brainwave activity increases. The Theta state corresponds to the experience of visionary, creative and intuitive levels of experience. It is characterized by "inner" images and visions that correlate with increased theta activity.

0.5-4hz Delta Waves

The Delta frequency range between 0.5 - 4Hz brings a level of balance that corresponds to the "beyond the mind" experience at the subtlest levels of meditative awareness possible. This is the range in which meditators experience what is termed unified consciousness (oneness with all things).

DON'T THINK — MEDITATE

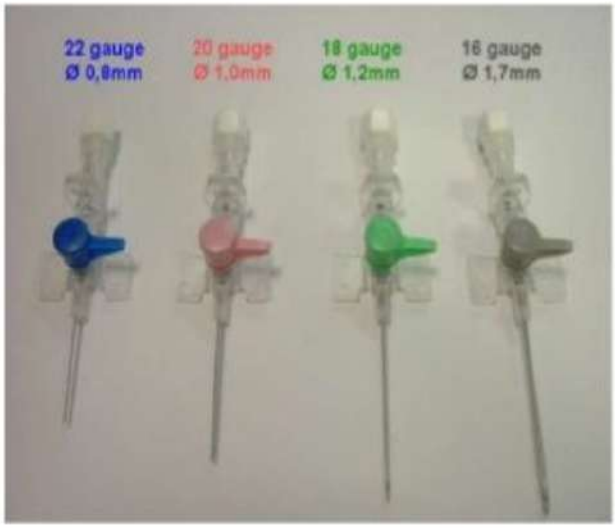
synchronicity.org/meditation

Purposes:

1. To administer required blood component by the patient
2. To restore the blood volume
3. To improve oxygen-carrying capacity of the blood.

Equipment:

- Unit of blood
- Normal saline (PNSS)
- Blood transfusion set
- Venipuncture set containing needle gauge of #18 or #19
- Alcohol and povidone-iodine swabs
- Tape
- Clean gloves



Nursing Intervention:

- Verify doctor's order. Inform client and explain the purpose of the procedure.
- Check for cross-matching and blood typing. *To ensure compatibility*
- Obtain and record baseline VS

Note: If patient has fever do not transfuse

- Practice strict, ASEPSIS
- At least 2 nurses check the label of the blood transfusion, Check the following:
  - Serial Number
  - Blood component
  - Blood type
  - Rh factor
  - Expiration date
  - Screening test
- Check the blood for gas bubbles and any unusual color or cloudiness

Note: Gas bubbles indicate bacterial growth Unusual color or cloudiness indicate hemolysis

- Warm blood at room temperature before transfusion.
- Identify client properly, two nurses check the client's identification
- Set up the infusion equipment, use BT set with filter. *To prevent administration of blood clots and other particles.*
- Prepare the blood bag, expose the port on the blood bag and insert the BT set, open the clamp let blood flow to the tube up the needle.
  To remove air in the tubing

Note:
Blood is transfuse as a side drip to PNSS. Direct transfusion is done during emergency situation and as ordered.

Blood Shelf Life

WBC **PRBC**	Warm at room temperature transfused immediately	**4 degree C**
Washed RBC	Transfused within 1 ½ hours	**4 degree C**
FFP	Use immediately upon thawing	**- 18 degree C**
Cryoprecipitate		
Platelets		**20 degree C**

NURSING SKILLS

BLOOD TRANSFUSION/ IV THERAPY

Lecturer: *Mark Fredderick R. Abejo RN, MAN*

Blood Transfusion

Blood Compatibility

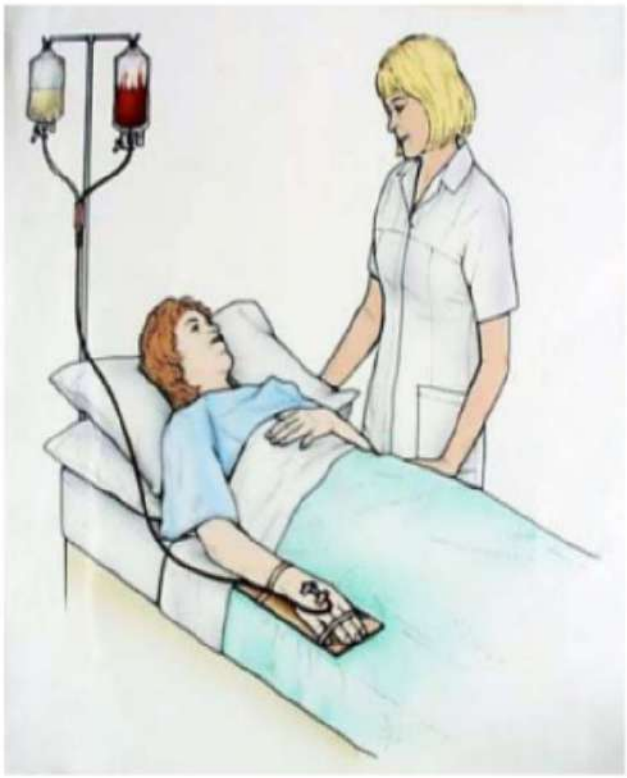
	Compatible	*Incompatible*
A	A / O	AB / B
B	B / O	AB / A
AB	A / B / AB / O	
O	O	A / B / AB

Note:

Type AB " Universal Recipient"
Type O " Universal Donor"

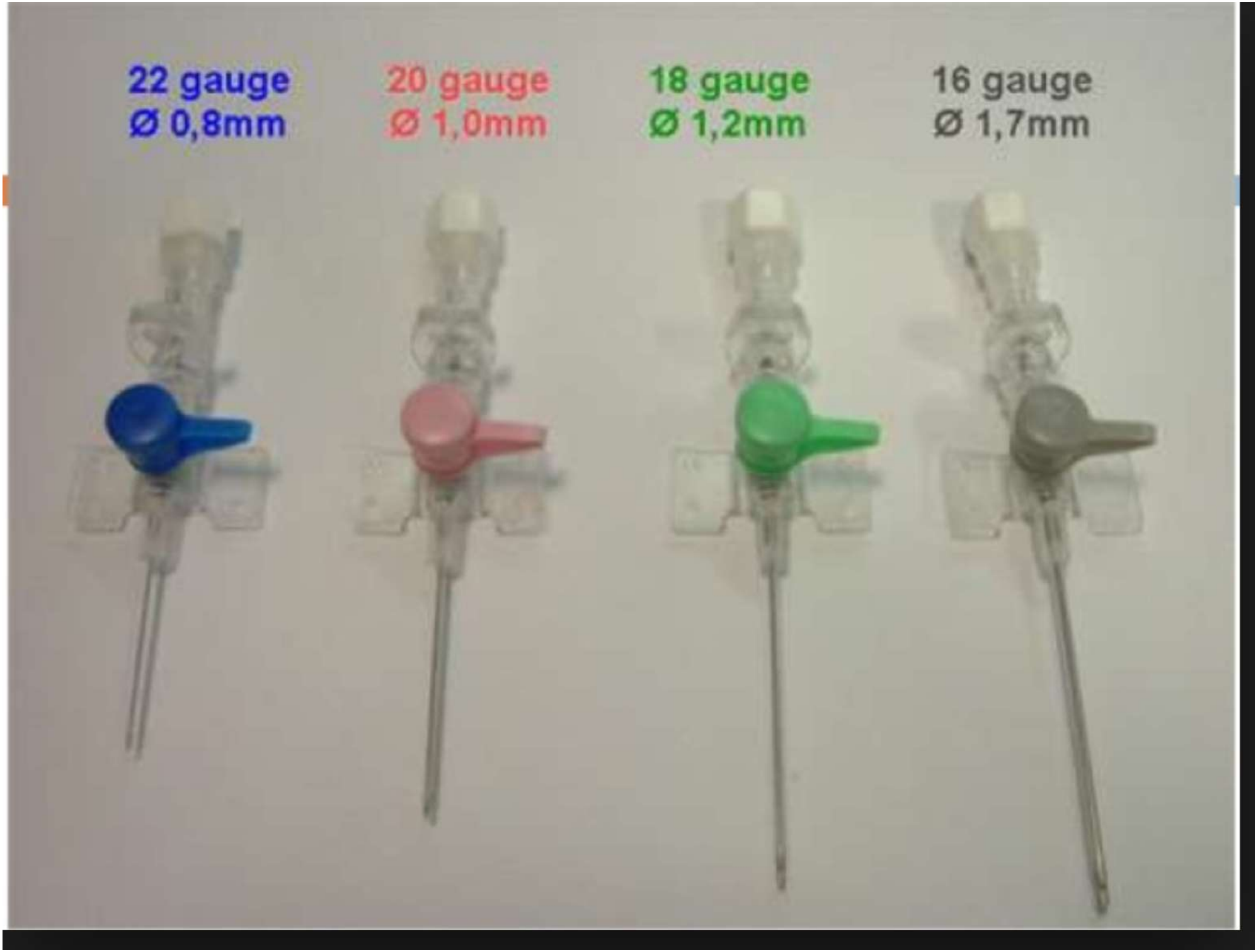
Blood Products for Transfusion:

Product	Uses
Whole Blood	Not commonly used except for extreme cases of acute hemorrhage. Replaces blood volume and all blood products
PRBC	Used to increase the oxygen-carrying capacity of blood
Platelets	Replaces platelets in client with bleeding disorder or platelet deficiency
Fresh Frozen Plasma	Expands blood volume and provides clotting factor. *Note:* *Does not need to be typed and cross-matched, contains no RBCs*
Albumin and plasma protein fraction	Blood volume expander Provide plasma proteins
Clotting factor and cryoprecipitate	Used for client with clotting deficiencies Cryoprecipitate also contains fibrinogen



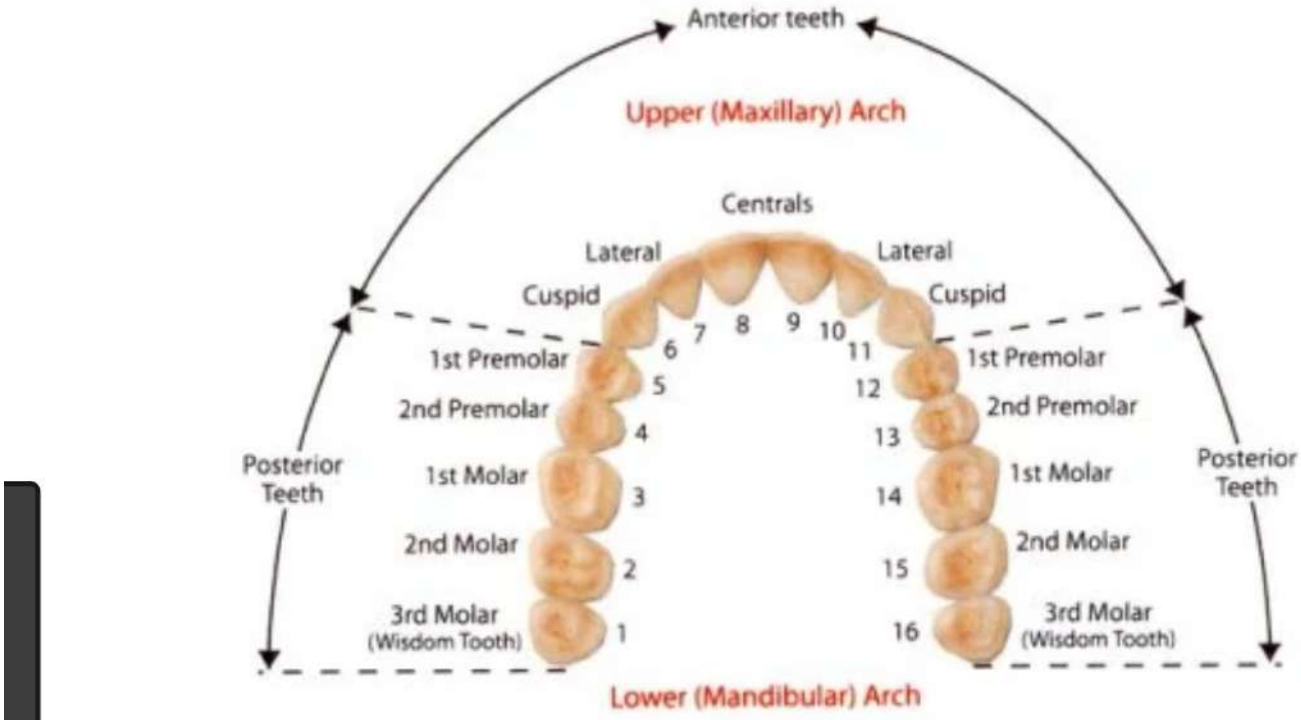
Cannula Sizes

- 16 and 14 gauge (Orange and Grey)
  - Used in high risk surgical procedures
  - Requires a large vein
- 18 gauge (Green)
  - Used in trauma, surgery, blood transfusions, and for CT scan with dye
  - Requires a large vein
- 20 gauge (Pink)
  - Most commonly used
  - Suitable for non-emergent blood transfusions
- 22 gauge (Blue)
  - Older adults
  - Suitable for slow speed infusions
- 24 gauge (Yellow)
  - Used in pediatrics or elderly adults


22 gauge
Ø 0,8mm
20 gauge
Ø 1,0mm
18 gauge
Ø 1,2mm
16 gauge
Ø 1,7mm

Dental Chart and Common Terminology

Use this chart to effectively communicate your questions and concerns to us



OCCLUSAL - Used to describe the masticating or chewing surface of the posterior teeth.

BUCCAL SURFACE - Pertaining to the cheek. Used to describe the outside surfaces of the posterior teeth.

DISTAL - The surface of the tooth that is away from the median line.

MESIAL - The surface of the tooth that is towards the median line.

LINGUAL SURFACE - The inside or tongue surfaces of all teeth.

MEDIAN LINE - An imaginary line between the two centrals.

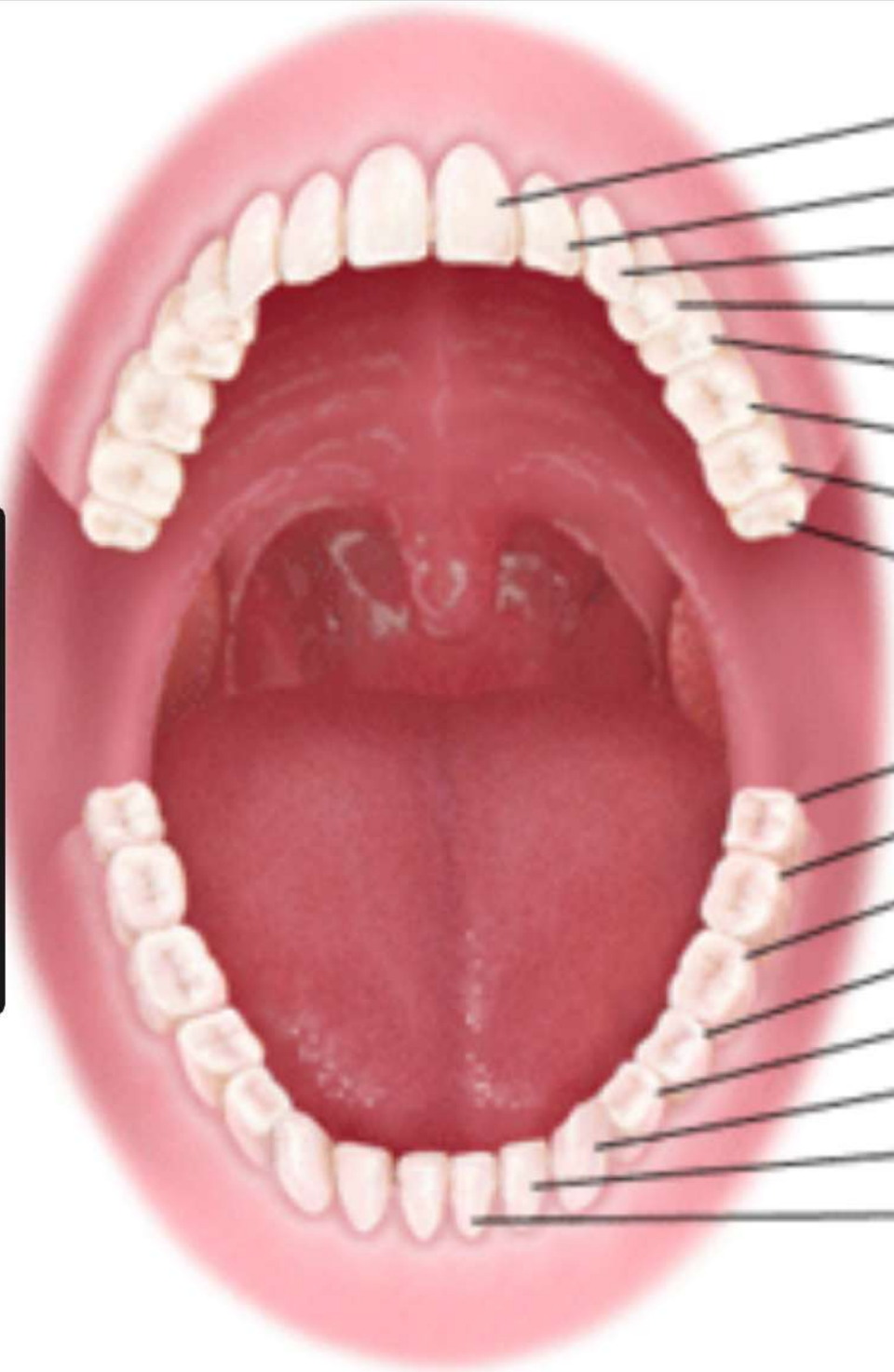
PROXIMAL - The surface of a tooth adjoining another tooth. Usually the Mesial or Distal surface unless the tooth is rotated.

CUSPS - Tapering projections upon the crown of a tooth.

SULCUS - A groove or depression on the surface of the tooth.

LABIAL SURFACE - Pertaining to the lip. Used to describe the front surface of the anterior teeth.

INCISAL - The biting edge of anterior teeth.



	(years)
Central Incisor	7.35
Lateral Incisor	8.45
Canine (Cuspid)	11.35
First Premolar (Bicuspid)	10.20
Second Premolar (Bicuspid)	11.05
First Molar	6.30
Second Molar	12.25
Third Molar	Variable 17 to 21
Third Molar	
Second Molar	11.90
First Molar	6.05
Second Premolar (Bicuspid)	11.20
First Premolar (Bicuspid)	10.50
Canine (Cuspid)	10.35
Lateral Incisor	7.50
Central Incisor	6.40

It's All in Your Mind

Learn why your mind is a quantum computer, defining your unique reality.

1. YOUR MIND IS A COMPUTER

Your brain is the hardware. Your mindware is the software.

You have Unconscious and Conscious Mindware

2. YOUR UNCONSCIOUS MIND IS THE MASTER

Unconscious mindware drives ~ **95%** of beliefs and behaviors.

Unconscious mindware processes all of the information you receive.

It selects what you consciously recognize, react to and process.

3. WHAT IS REALITY?

Our Unconscious takes in 11,000,000 bits/second of data.

It selects 126 bits/second to share with our Conscious mind.

WELCOME TO YOUR QUANTUM MIND!

11,000,000 bits/second enters your Unconscious mind

Visuals Sounds Feelings Tastes Smells

4. HOW WE FILTER OUR INFORMATION

Deletion: We delete data that doesn't match our focus or expectations.

Example: Losing track of a conversation when someone we know enters the room.

Distortion: We distort data to make it match our focus or expectations.

Example: When a penalty is called in a game. One fan sees it as right, the opposite team fan sees it as a bad call.

Generalization: We generalize data to make it fit into our categories/knowns.

Example: Categories include "jocks, nerds", "lazy, stubborn," "cool, geeky"

126 bits/second goes to your Conscious Mind for Action

5. MINDWARE PROGRAMS WE USE

MetaPrograms: infrastructure that drives behavior.

Values: Filters that drive how we think.

Beliefs: Based on experience and learning.

Decisions: Early decisions (I'm unworthy) become foundation for future decisions.

Memories: Apply past emotions to current data.

Language: Our unique way of defining our data and experiences.

Attitudes: Emotions attached to specific content.

Time & Space, Matter & Energy: We store/process everything based on time or space, matter or energy.

OUR MINDS BRING QUANTUM MECHANICS TO LIFE

At any point in time, we are presented with a limitless number of optional futures in our timeline. The data we select represents what we choose to see as reality.

CHANGE YOUR MIND, CHANGE YOUR REALITY

3 ways to leverage the power of your Quantum Mind

6. FOCUS ON WHAT YOU WANT

The mind does not process negatives.
" I can't lose this deal" = "Lose this deal" to your mind.

Say "I will win this deal."

7. SHUFFLE THE DECK

Your unconscious mind sees what it expects to see, based on patterns.

Change the way information is presented to see new trends & opportunities.

8. ASK QUESTIONS

Statements focus our Unconscious on the subject.

Questions activate our Conscious to explore new insights.

rebel brown

www.rebelbrown.com

Graphics by: Diana Dicheva

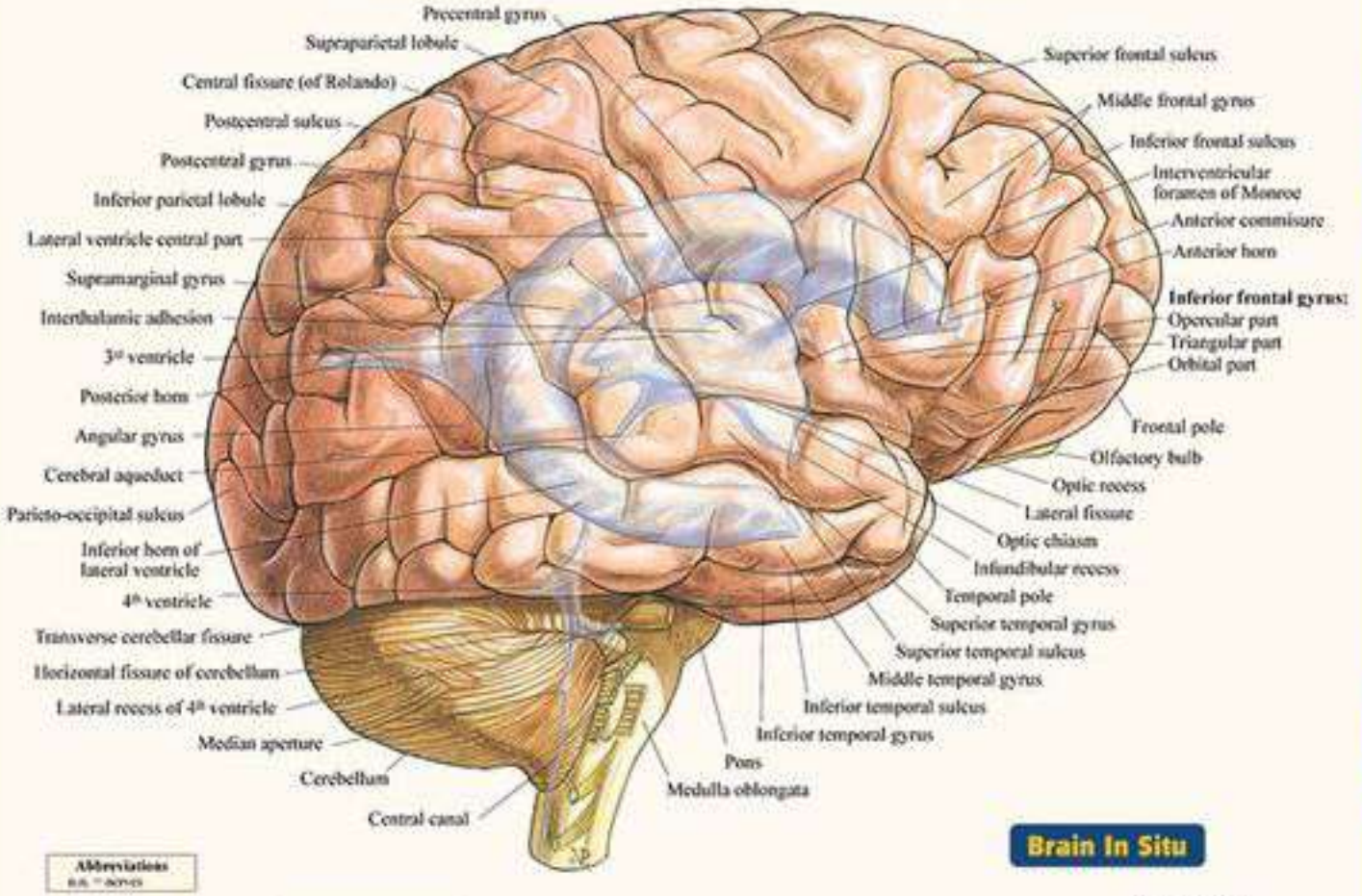
BarCharts, Inc.

Quick Study ACADEMIC

WORLD'S #1 ACADEMIC OUTLINE

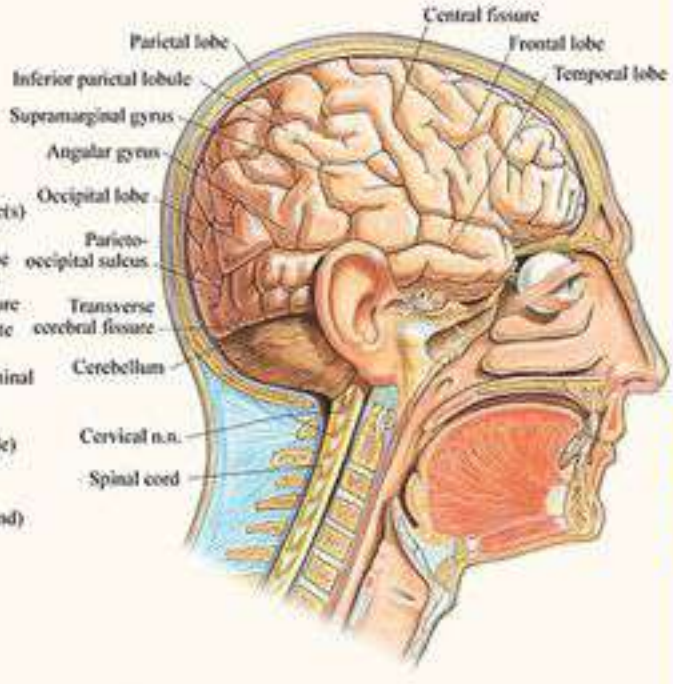
BRAIN

Lateral Surface & Ventricles (Brain Transparent)

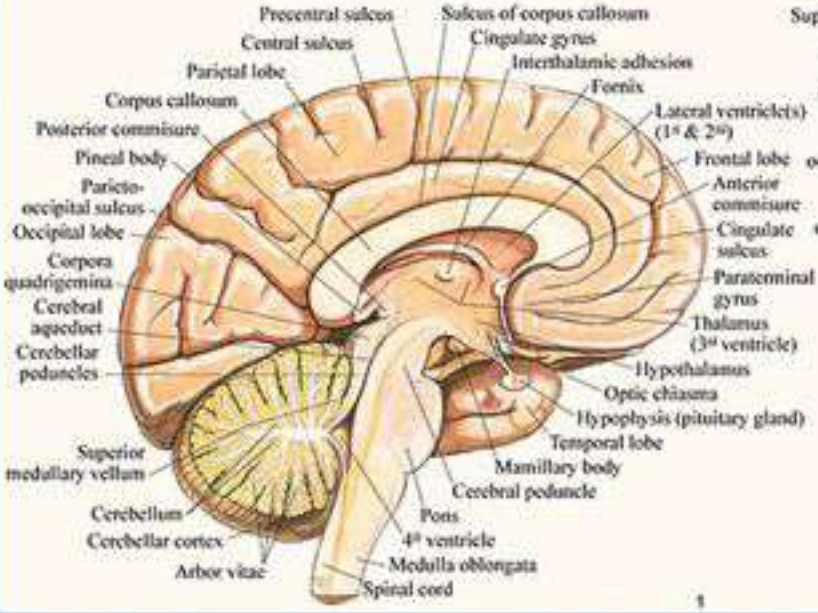


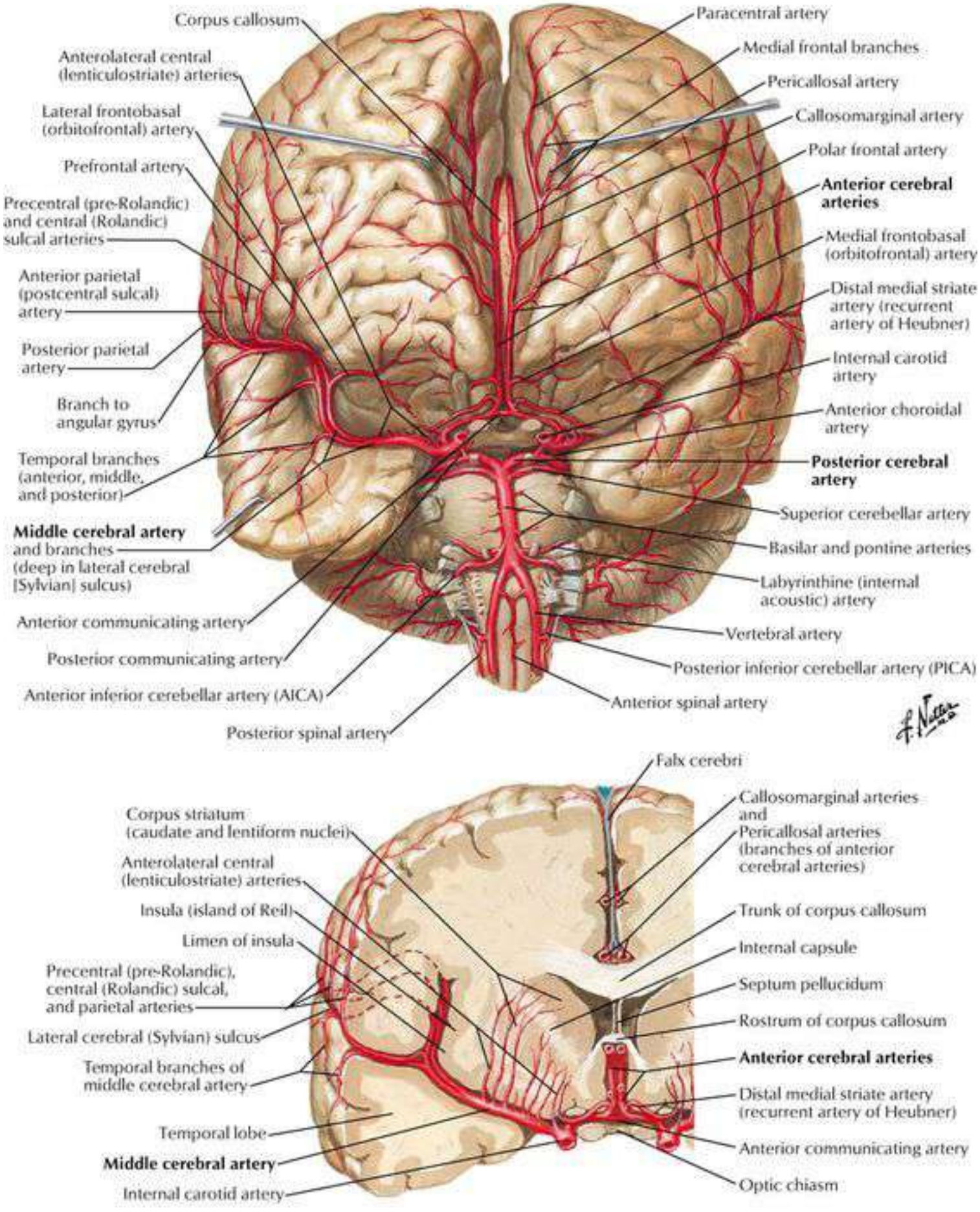
Abbreviations

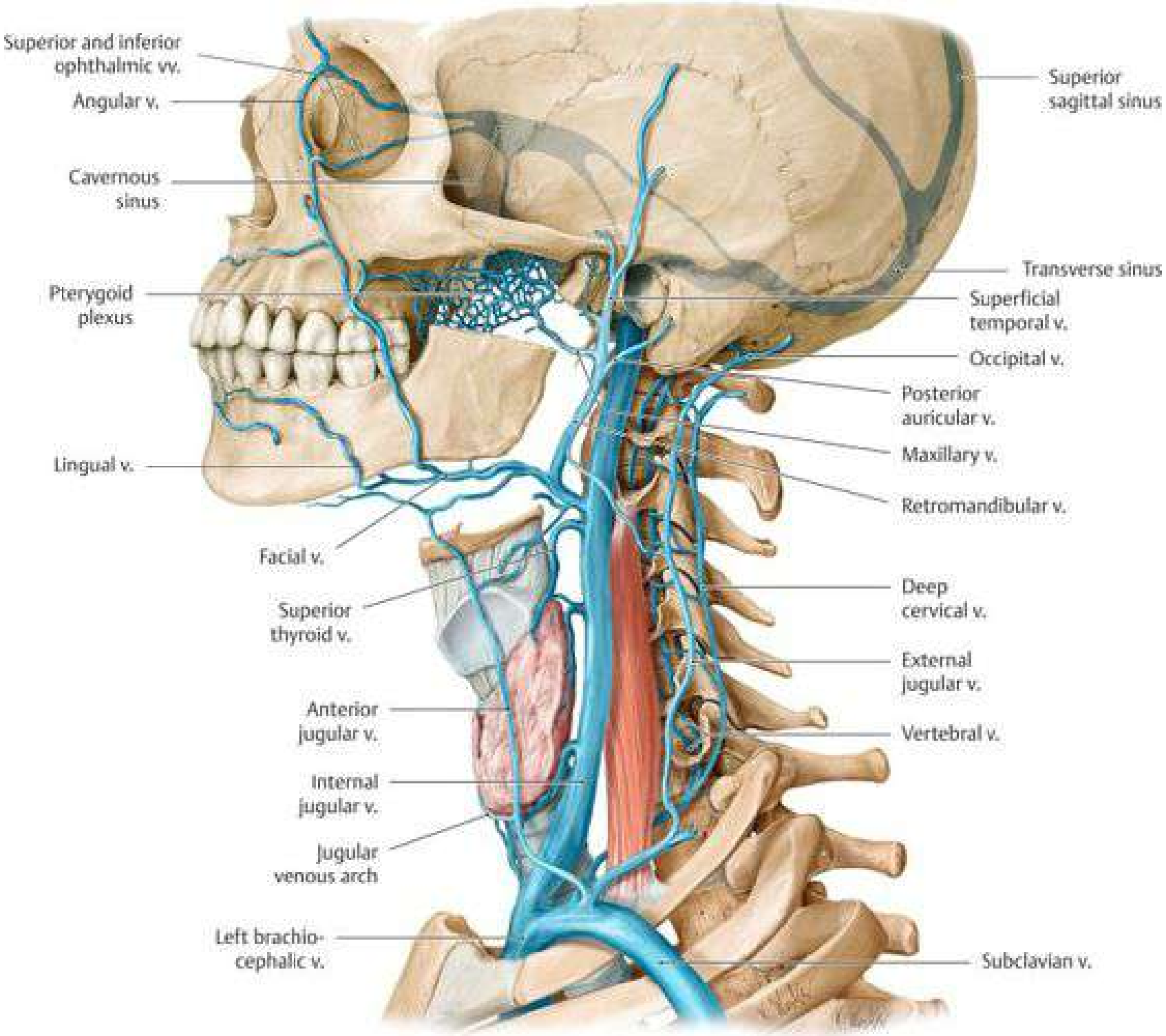
Brain In Situ



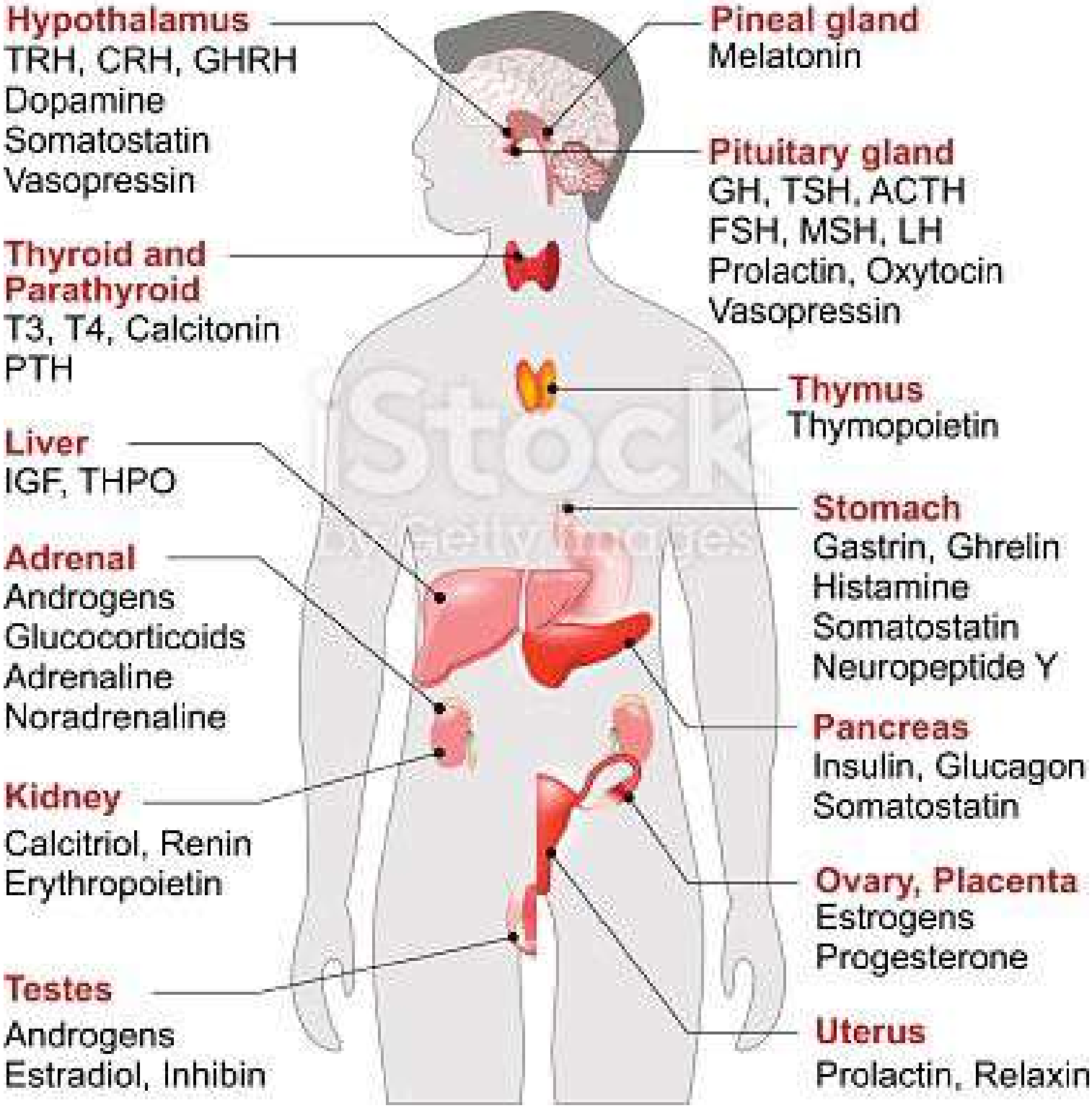
Sagittal View

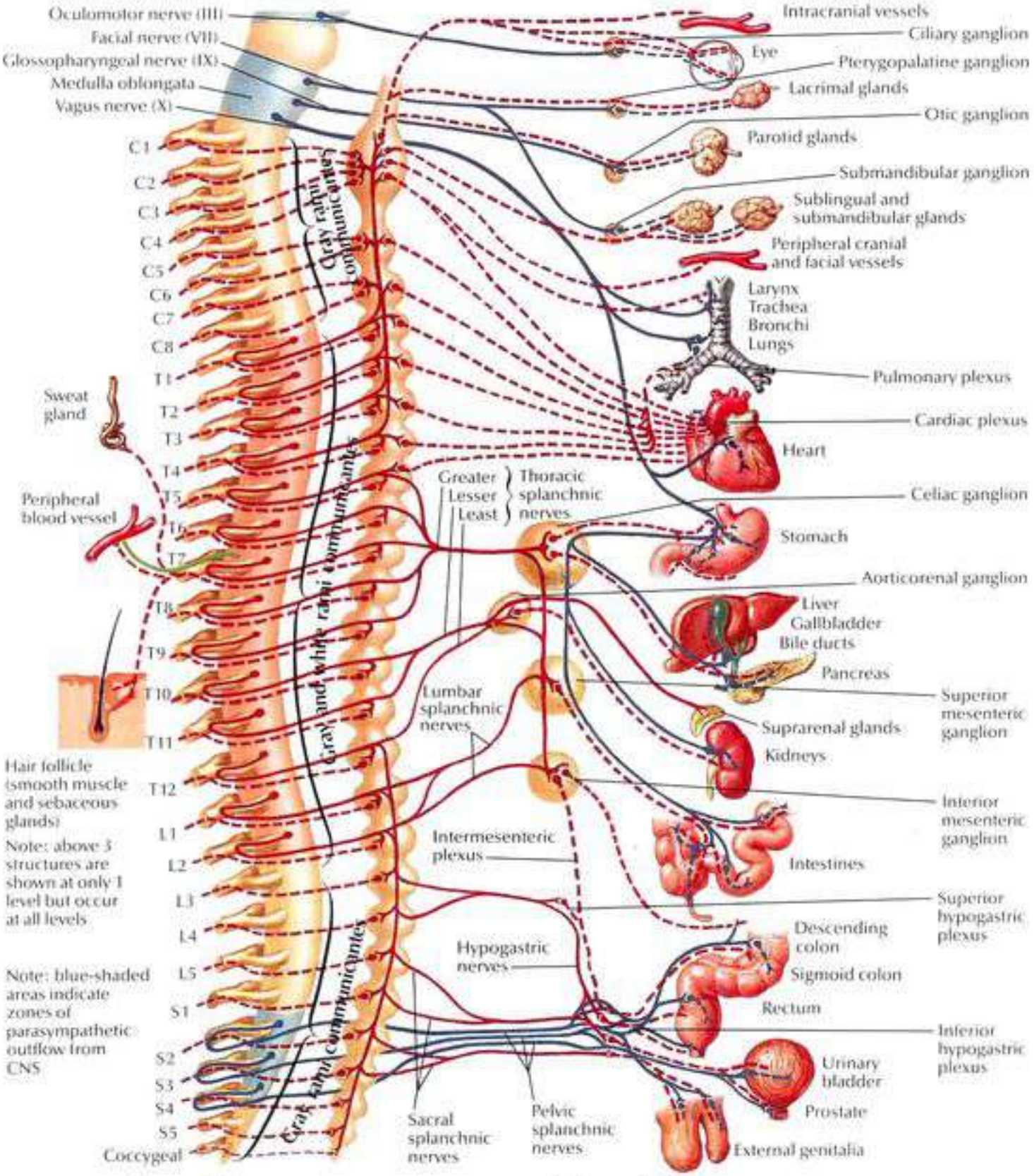


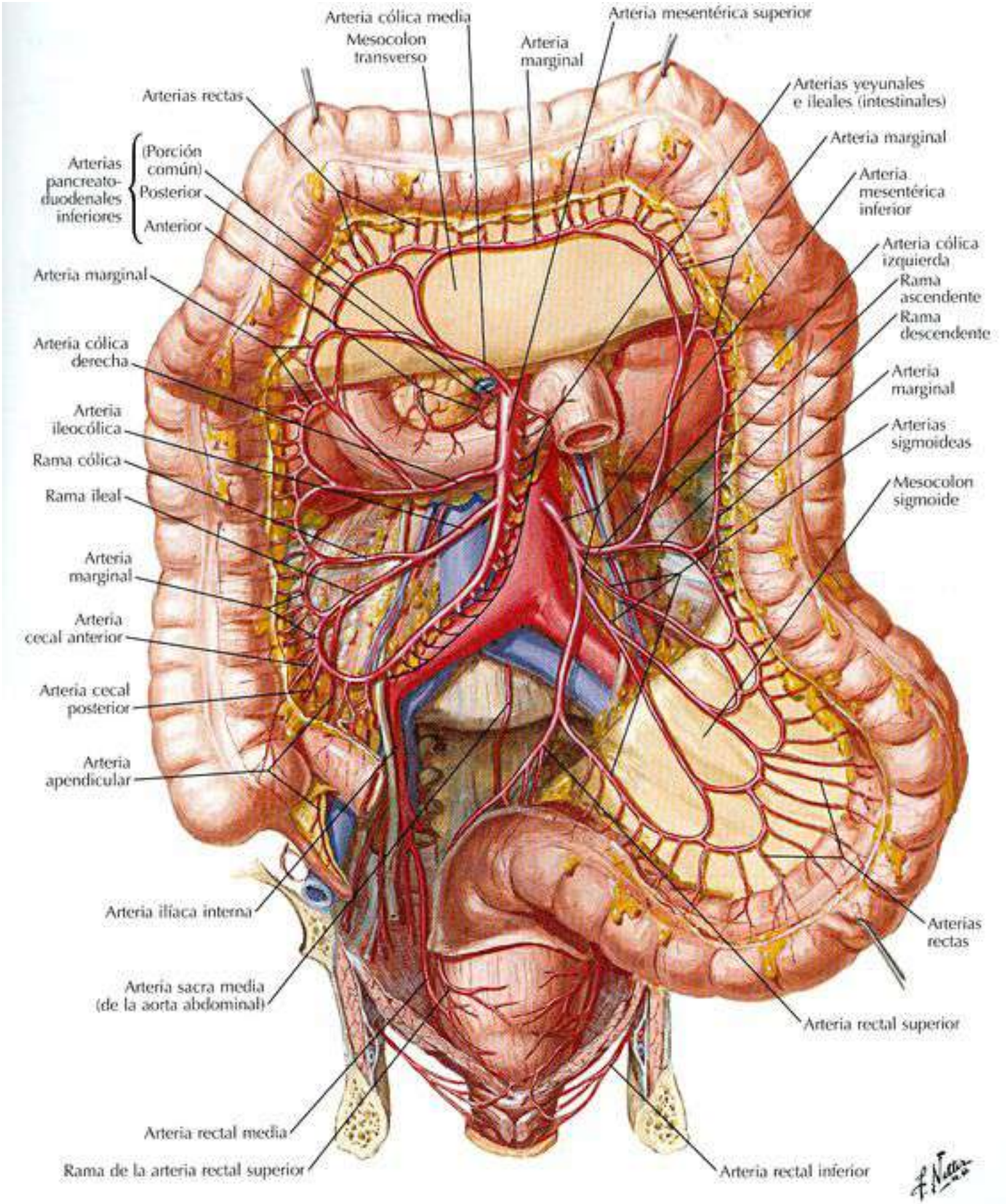

Corpus callosum
Anterolateral central (lenticulostriate) arteries
Lateral frontobasal (orbitofrontal) artery
Prefrontal artery
Precentral (pre-Rolandic) and central (Rolandic) sulcal arteries
Anterior parietal (postcentral sulcal) artery
Posterior parietal artery
Branch to angular gyrus
Temporal branches (anterior, middle, and posterior)
Middle cerebral artery and branches (deep in lateral cerebral [Sylvian] sulcus)
Anterior communicating artery
Posterior communicating artery
Anterior inferior cerebellar artery (AICA)
Posterior spinal artery
Paracentral artery
Medial frontal branches
Pericallosal artery
Callosomarginal artery
Polar frontal artery
Anterior cerebral arteries
Medial frontobasal (orbitofrontal) artery
Distal medial striate artery (recurrent artery of Heubner)
Internal carotid artery
Anterior choroidal artery
Posterior cerebral artery
Superior cerebellar artery
Basilar and pontine arteries
Labyrinthine (internal acoustic) artery
Vertebral artery
Posterior inferior cerebellar artery (PICA)
Anterior spinal artery
Falx cerebri
Corpus striatum (caudate and lentiform nuclei)
Anterolateral central (lenticulostriate) arteries
Insula (island of Reil)
Limen of insula
Precentral (pre-Rolandic), central (Rolandic) sulcal, and parietal arteries
Lateral cerebral (Sylvian) sulcus
Temporal branches of middle cerebral artery
Temporal lobe
Middle cerebral artery
Internal carotid artery
Callosomarginal arteries and Pericallosal arteries (branches of anterior cerebral arteries)
Trunk of corpus callosum
Internal capsule
Septum pellucidum
Rostrum of corpus callosum
Anterior cerebral arteries
Distal medial striate artery (recurrent artery of Heubner)
Anterior communicating artery
Optic chiasm

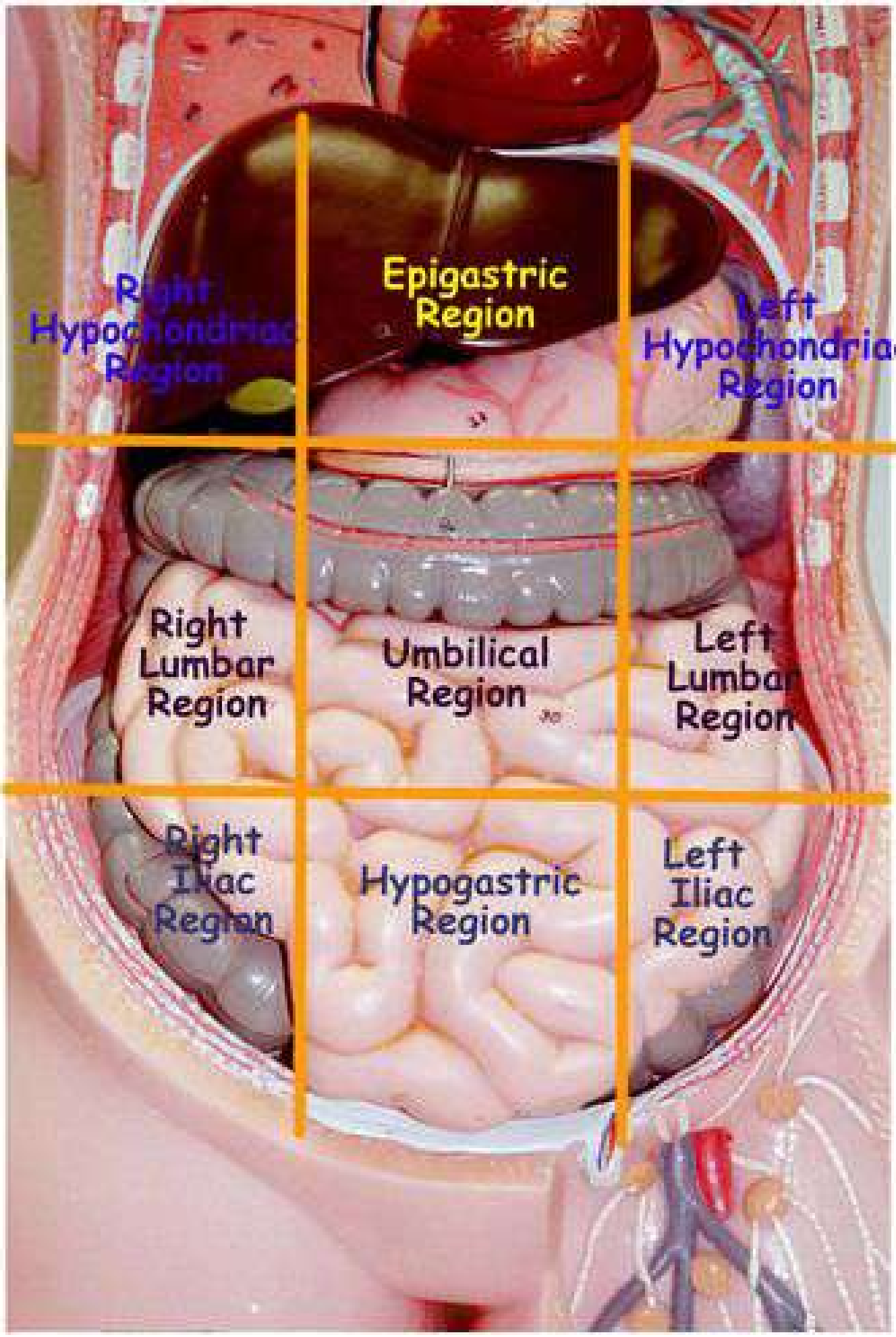

Superior and inferior ophthalmic vv.
Angular v.
Cavernous sinus
Pterygoid plexus
Lingual v.
Facial v.
Superior thyroid v.
Anterior jugular v.
Internal jugular v.
Jugular venous arch
Left brachio-cephalic v.
Superior sagittal sinus
Transverse sinus
Superficial temporal v.
Occipital v.
Posterior auricular v.
Maxillary v.
Retromandibular v.
Deep cervical v.
External jugular v.
Vertebral v.
Subclavian v.

HORMONES


Hypothalamus
TRH, CRH, GHRH
Dopamine
Somatostatin
Vasopressin
Pineal gland
Melatonin
Pituitary gland
GH, TSH, ACTH
FSH, MSH, LH
Prolactin, Oxytocin
Vasopressin
Thyroid and Parathyroid
T3, T4, Calcitonin
PTH
Thymus
Thymopoietin
Liver
IGF, THPO
Stomach
Gastrin, Ghrelin
Histamine
Somatostatin
Neuropeptide Y
Adrenal
Androgens
Glucocorticoids
Adrenaline
Noradrenaline
Pancreas
Insulin, Glucagon
Somatostatin
Kidney
Calcitriol, Renin
Erythropoietin
Ovary, Placenta
Estrogens
Progesterone
Testes
Androgens
Estradiol, Inhibin
Uterus
Prolactin, Relaxin


Oculomotor nerve (III)
Facial nerve (VII)
Glossopharyngeal nerve (IX)
Medulla oblongata
Vagus nerve (X)
C1
C2
C3
C4
C5
C6
C7
C8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
S5
Coccygeal
Gray rami communicantes
White rami communicantes
Gray and white rami communicantes
Sweat gland
Peripheral blood vessel
Hair follicle (smooth muscle and sebaceous glands)
Note: above 3 structures are shown at only 1 level but occur at all levels
Note: blue-shaded areas indicate zones of parasympathetic outflow from CNS
Intracranial vessels
Ciliary ganglion
Eye
Pterygopalatine ganglion
Lacrimal glands
Otic ganglion
Parotid glands
Submandibular ganglion
Sublingual and submandibular glands
Peripheral cranial and facial vessels
Larynx
Trachea
Bronchi
Lungs
Pulmonary plexus
Cardiac plexus
Heart
Greater
Lesser
Least
Thoracic splanchnic nerves
Celiac ganglion
Stomach
Aorticorenal ganglion
Liver
Gallbladder
Bile ducts
Pancreas
Superior mesenteric ganglion
Suprarenal glands
Kidneys
Lumbar splanchnic nerves
Inferior mesenteric ganglion
Intermesenteric plexus
Intestines
Superior hypogastric plexus
Descending colon
Hypogastric nerves
Sigmoid colon
Rectum
Inferior hypogastric plexus
Urinary bladder
Prostate
External genitalia
Sacral splanchnic nerves
Pelvic splanchnic nerves
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Antidromic conduction


Arteria cólica media
Mesocolon transverso
Arteria marginal
Arteria mesentérica superior
Arterias rectas
Arterias yeyunales e ileales (intestinales)
Arteria marginal
Arterias pancreato-duodenales inferiores
(Porción común)
Posterior
Anterior
Arteria mesentérica inferior
Arteria cólica izquierda
Rama ascendente
Rama descendente
Arteria marginal
Arteria cólica derecha
Arteria ileocólica
Rama cólica
Rama ileal
Arteria marginal
Arterias sigmoideas
Mesocolon sigmoide
Arteria cecal anterior
Arteria cecal posterior
Arteria apendicular
Arteria ilíaca interna
Arterias rectas
Arteria sacra media (de la aorta abdominal)
Arteria rectal superior
Arteria rectal media
Rama de la arteria rectal superior
Arteria rectal inferior


Right Hypochondriac Region
Epigastric Region
Left Hypochondriac Region
Right Lumbar Region
Umbilical Region
Left Lumbar Region
Right Iliac Region
Hypogastric Region
Left Iliac Region

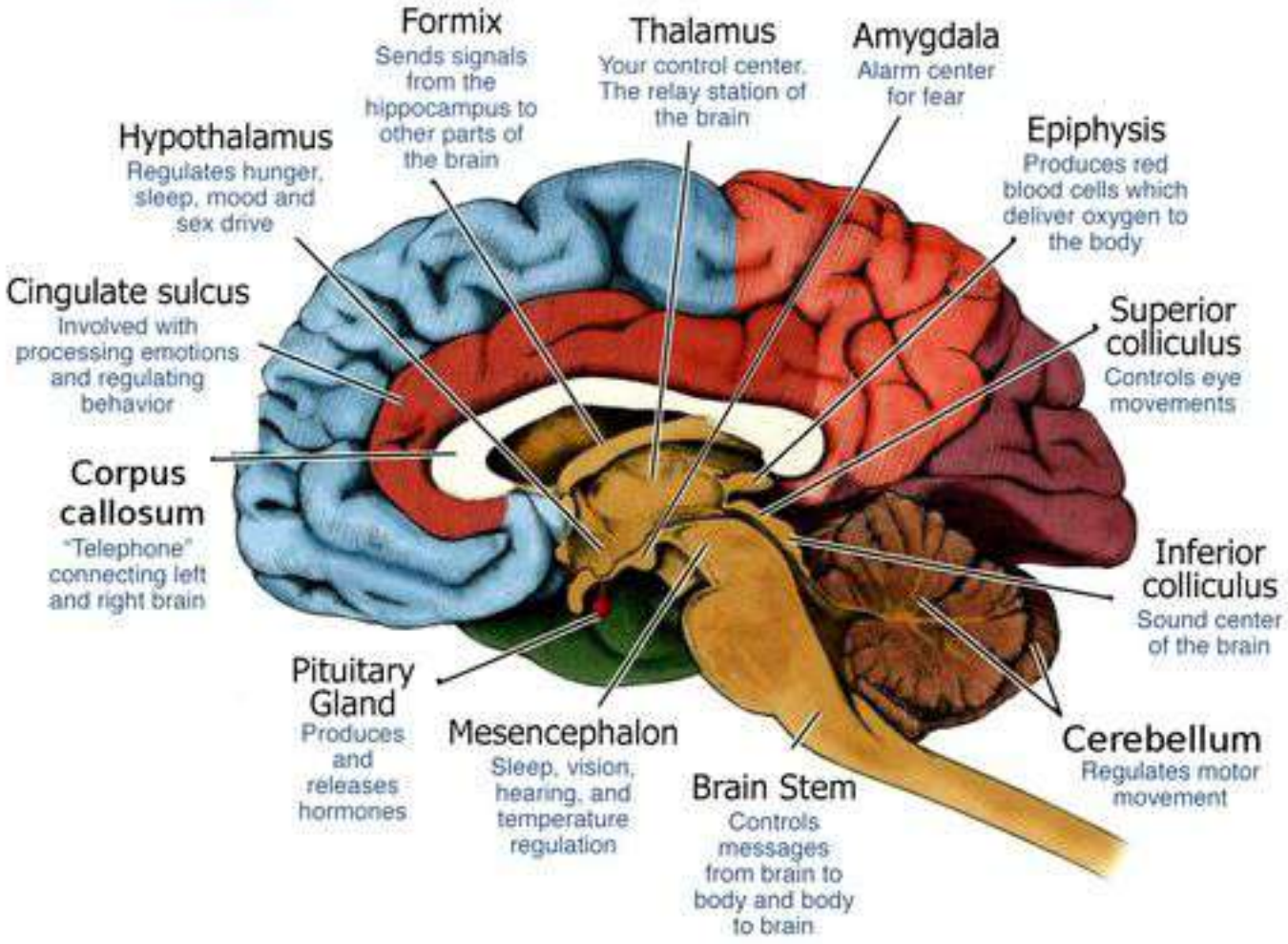
Trauma Brain Processing

1 **The Brain Regularly Scans for Real or Perceived Threats**

Information is filtered through the limbic system, where we instinctively react with "fight, flight, or freeze."

2 **When a Threat is Perceived**

The amygdala alerts the hypothalamus to release stress hormones and alarms the sympathetic nervous system to fight, flight or freeze.



3 **Reaction to the "Fight, Flight or Freeze" Response**

Fear, frustration and heartache influence the mind, resulting in unrelated decisions, choices and reactions.

4 **Prior Childhood and Adult Trauma Increases the Brain-Body Response**

With prior trauma, the parasympathetic nervous system is automatically activated, resulting in numbing or dissociating.

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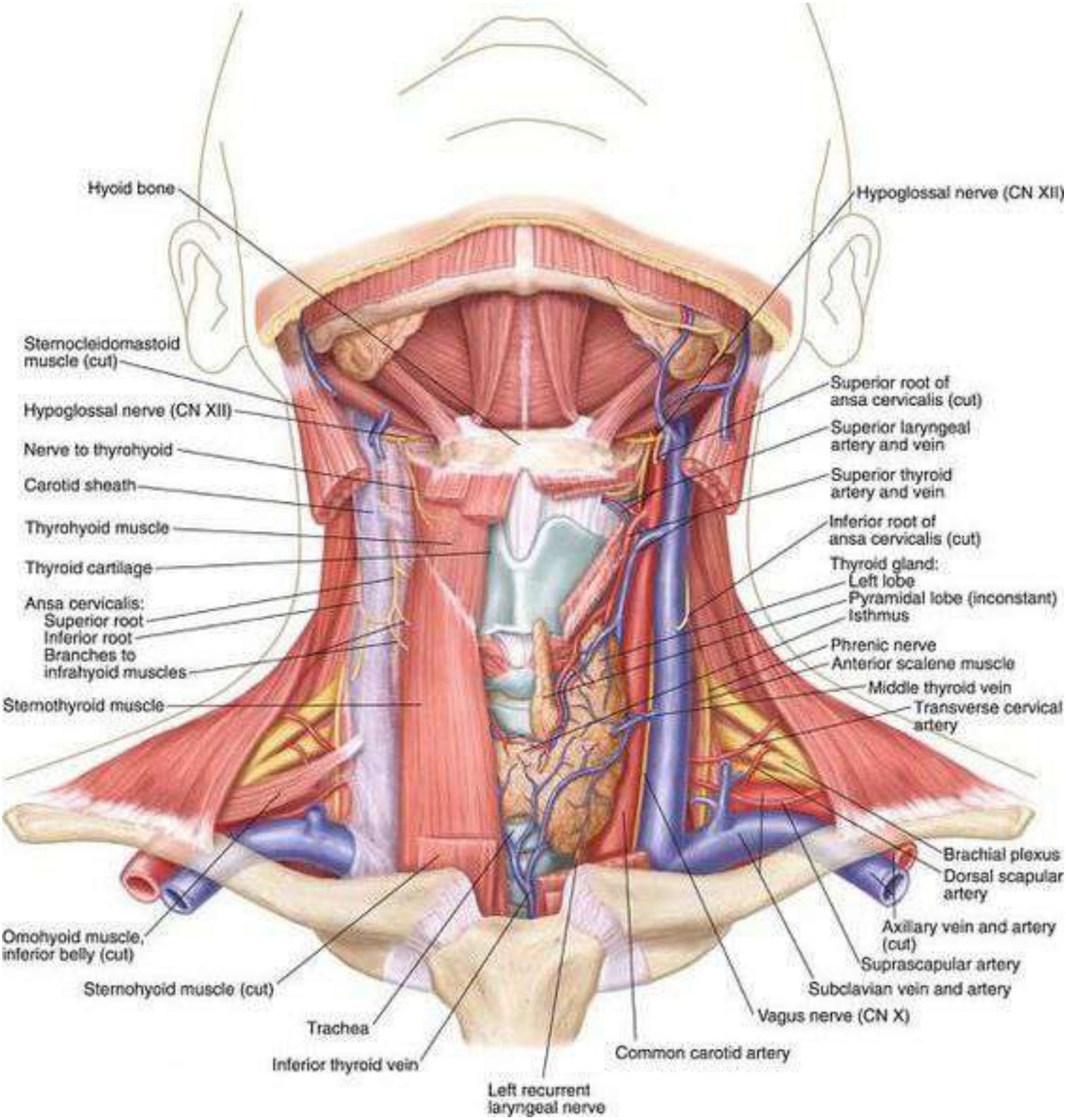
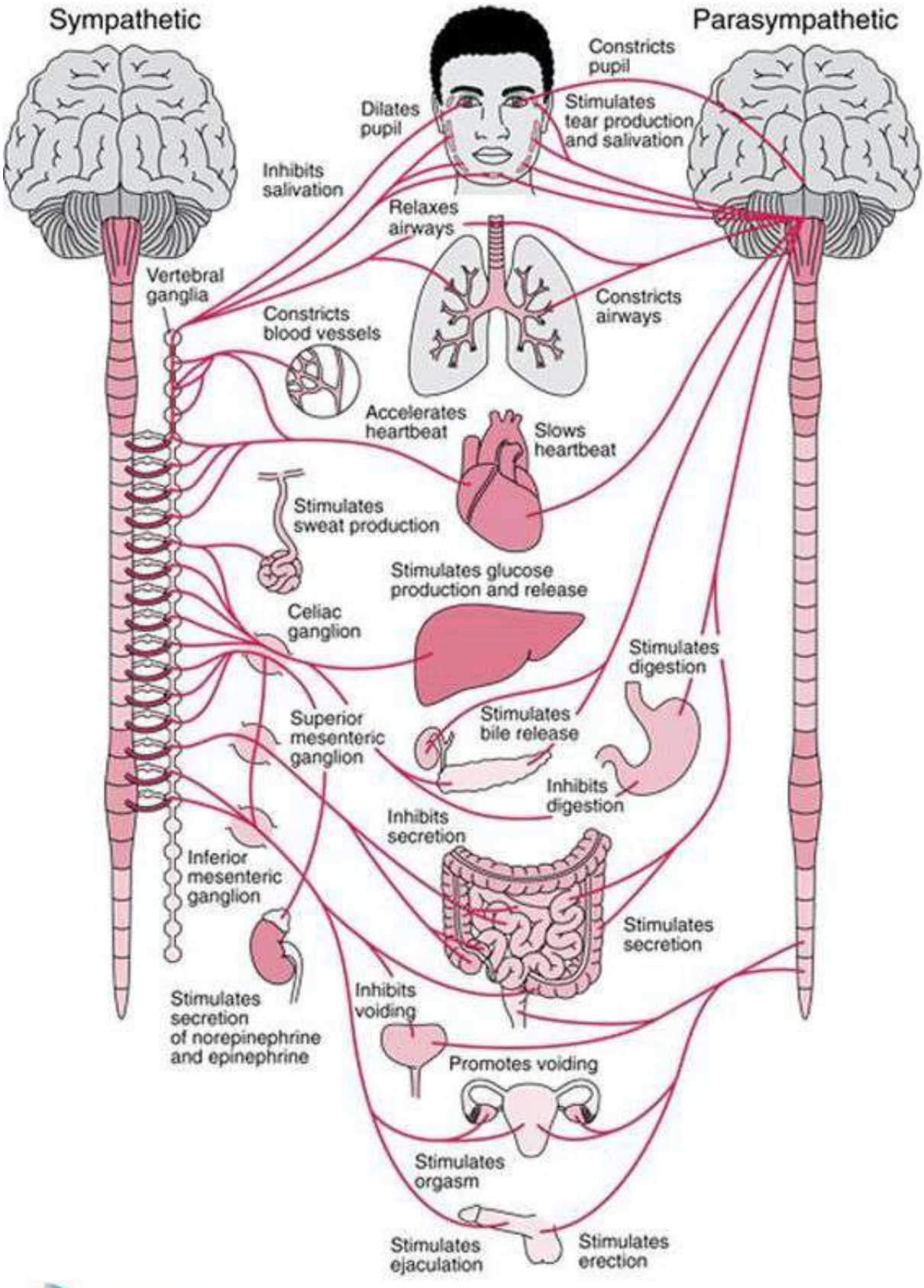
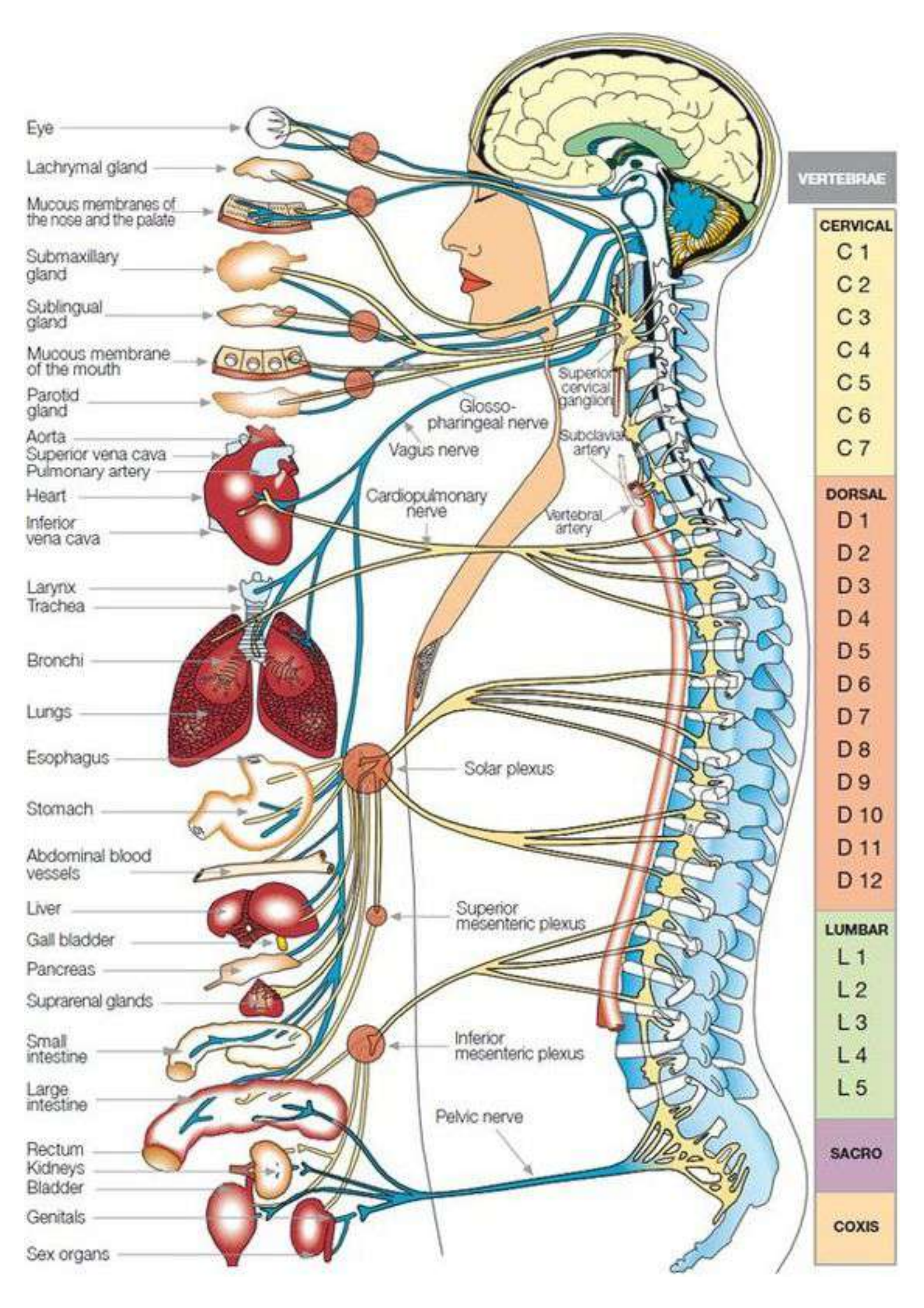
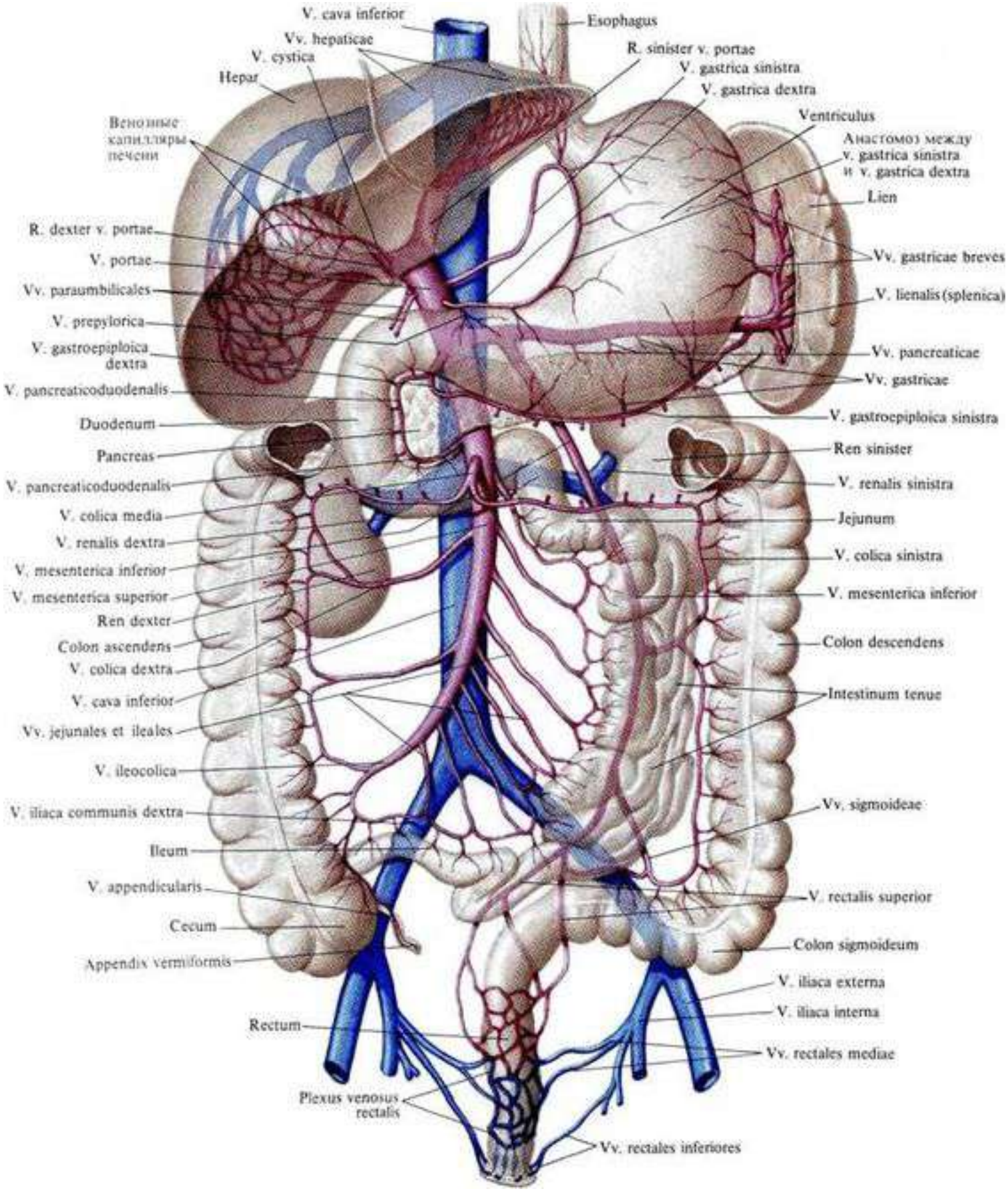

Hyoid bone
Hypoglossal nerve (CN XII)
Sternocleidomastoid muscle (cut)
Hypoglossal nerve (CN XII)
Nerve to thyrohyoid
Carotid sheath
Thyrohyoid muscle
Thyroid cartilage
Ansa cervicalis:
Superior root
Inferior root
Branches to infrahyoid muscles
Sternothyroid muscle
Omohyoid muscle, inferior belly (cut)
Sternohyoid muscle (cut)
Trachea
Inferior thyroid vein
Left recurrent laryngeal nerve
Common carotid artery
Vagus nerve (CN X)
Subclavian vein and artery
Suprascapular artery
Axillary vein and artery (cut)
Dorsal scapular artery
Brachial plexus
Transverse cervical artery
Middle thyroid vein
Anterior scalene muscle
Phrenic nerve
Isthmus
Pyramidal lobe (inconstant)
Left lobe
Thyroid gland:
Inferior root of ansa cervicalis (cut)
Superior thyroid artery and vein
Superior laryngeal artery and vein
Superior root of ansa cervicalis (cut)

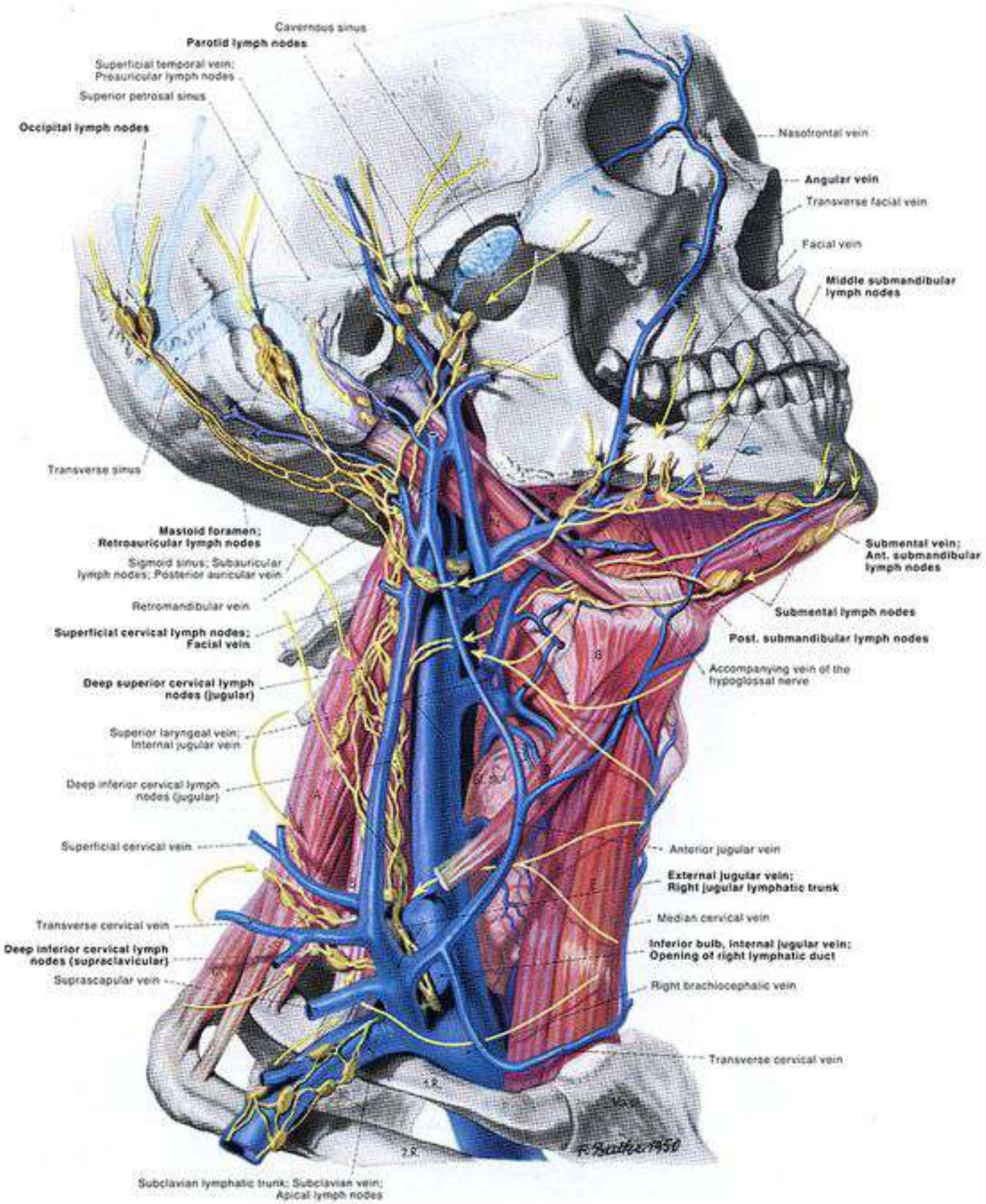
Overview of the Autonomic Nervous System

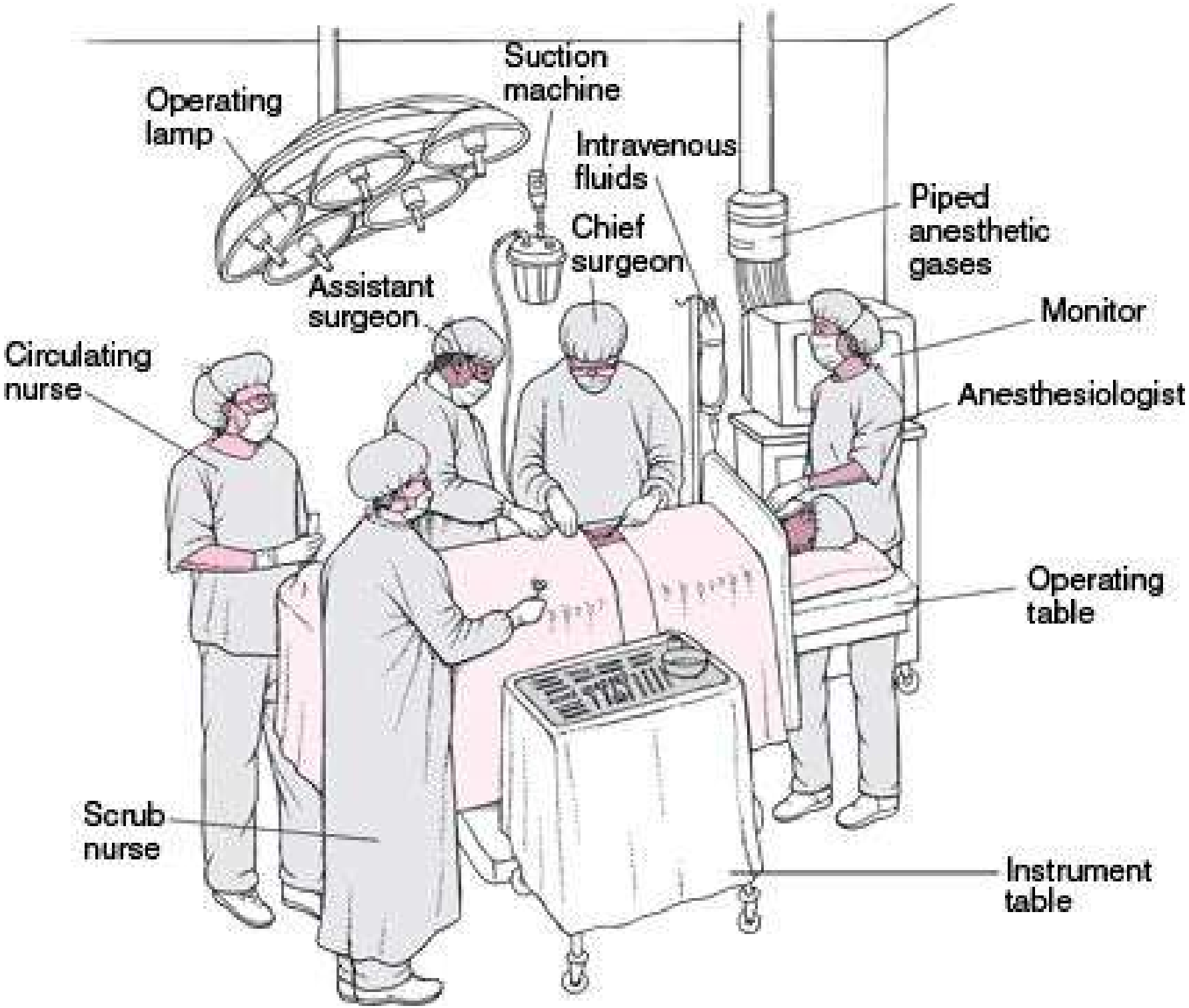


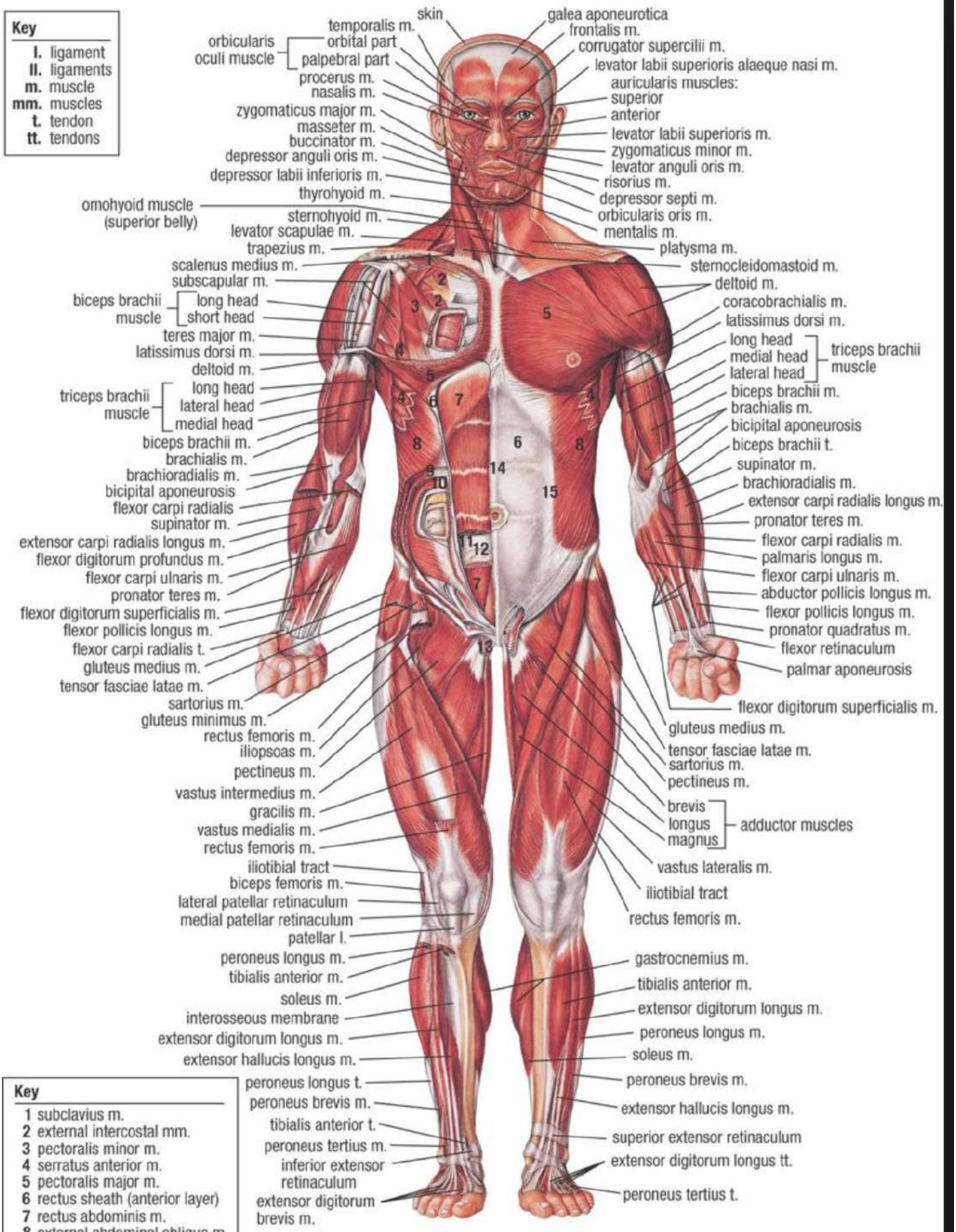
MERCK MANUAL

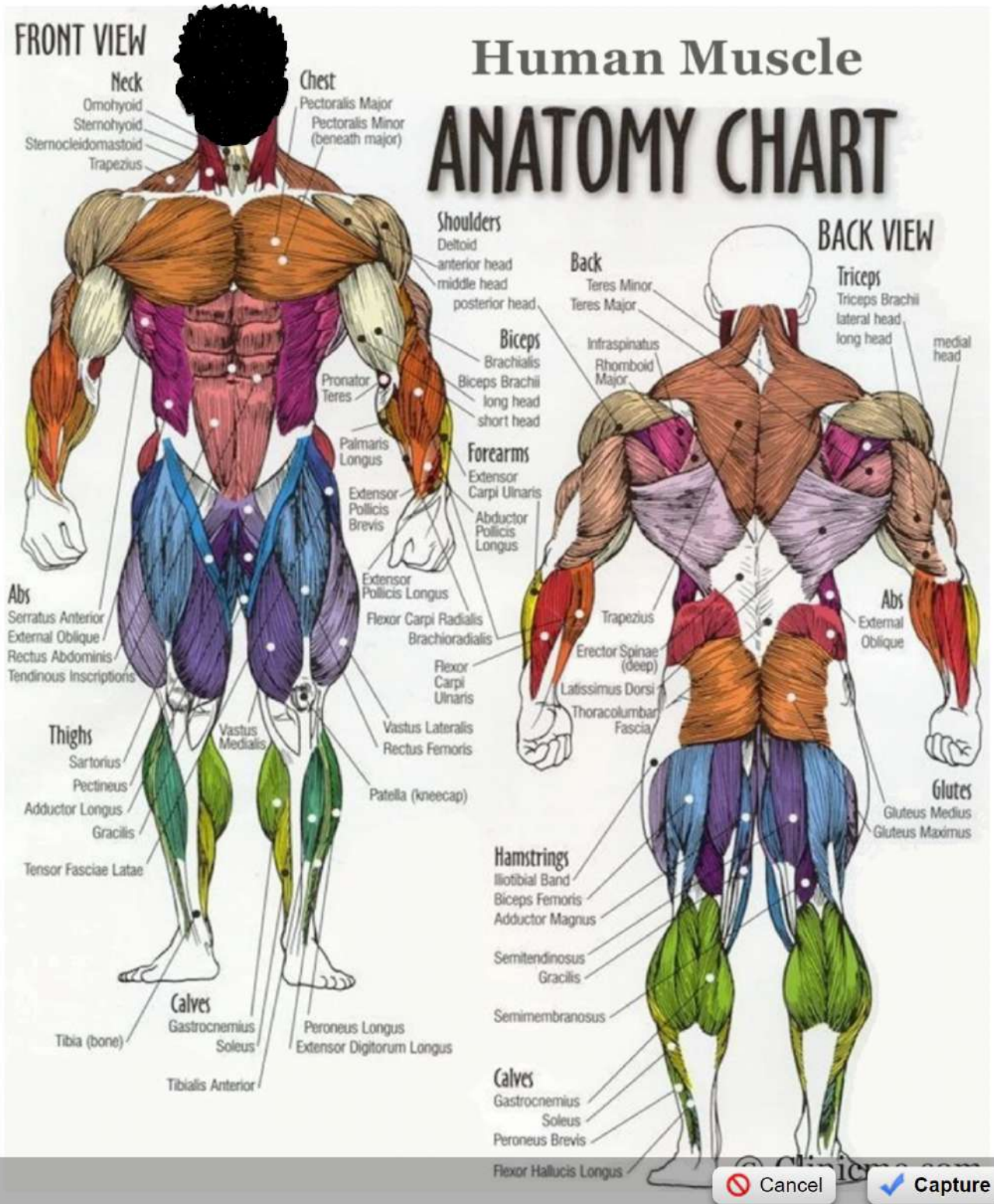

Eye
Lachrymal gland
Mucous membranes of the nose and the palate
Submaxillary gland
Sublingual gland
Mucous membrane of the mouth
Parotid gland
Aorta
Superior vena cava
Pulmonary artery
Heart
Inferior vena cava
Larynx
Trachea
Bronchi
Lungs
Esophagus
Stomach
Abdominal blood vessels
Liver
Gall bladder
Pancreas
Suprarenal glands
Small intestine
Large intestine
Rectum
Kidneys
Bladder
Genitals
Sex organs
Glosso-pharingeal nerve
Vagus nerve
Cardiopulmonary nerve
Superior cervical ganglion
Subclavian artery
Vertebral artery
Solar plexus
Superior mesenteric plexus
Inferior mesenteric plexus
Pelvic nerve
VERTEBRAE
CERVICAL
C 1
C 2
C 3
C 4
C 5
C 6
C 7
DORSAL
D 1
D 2
D 3
D 4
D 5
D 6
D 7
D 8
D 9
D 10
D 11
D 12
LUMBAR
L 1
L 2
L 3
L 4
L 5
SACRO
COXIS


V. cava inferior
Esophagus
Vv. hepaticae
V. cystica
R. sinister v. portae
Hepar
V. gastrica sinistra
V. gastrica dextra
Ventriculus
Венозные капилляры печени
Анастомоз между v. gastrica sinistra и v. gastrica dextra
Lien
R. dexter v. portae
V. portae
Vv. gastricae breves
Vv. paraumbilicales
V. lienalis (splenica)
V. prepylorica
V. gastroepiploica dextra
Vv. pancreaticae
Vv. gastricae
V. pancreaticoduodenalis
V. gastroepiploica sinistra
Duodenum
Ren sinister
Pancreas
V. pancreaticoduodenalis
V. renalis sinistra
V. colica media
Jejunum
V. renalis dextra
V. colica sinistra
V. mesenterica inferior
V. mesenterica superior
V. mesenterica inferior
Ren dexter
Colon ascendens
Colon descendens
V. colica dextra
Intestinum tenue
V. cava inferior
Vv. jejunales et ileales
V. ileocolica
Vv. sigmoideae
V. iliaca communis dextra
Ileum
V. appendicularis
V. rectalis superior
Cecum
Colon sigmoideum
Appendix vermiformis
V. iliaca externa
V. iliaca interna
Rectum
Vv. rectales mediae
Plexus venosus rectalis
Vv. rectales inferiores


Cavernous sinus
Parotid lymph nodes
Superficial temporal vein; Preauricular lymph nodes
Superior petrosal sinus
Occipital lymph nodes
Nasofrontal vein
Angular vein
Transverse facial vein
Facial vein
Middle submandibular lymph nodes
Transverse sinus
Mastoid foramen; Retroauricular lymph nodes
Sigmoid sinus; Subauricular lymph nodes; Posterior auricular vein
Retromandibular vein
Superficial cervical lymph nodes; Facial vein
Deep superior cervical lymph nodes (jugular)
Superior laryngeal vein; Internal jugular vein
Deep inferior cervical lymph nodes (jugular)
Superficial cervical vein
Submental vein; Ant. submandibular lymph nodes
Submental lymph nodes
Post. submandibular lymph nodes
Accompanying vein of the hypoglossal nerve
Anterior jugular vein
External jugular vein; Right jugular lymphatic trunk
Median cervical vein
Inferior bulb, internal jugular vein; Opening of right lymphatic duct
Right brachiocephalic vein
Transverse cervical vein
Transverse cervical vein
Deep inferior cervical lymph nodes (supraclavicular)
Suprascapular vein
Subclavian lymphatic trunk; Subclavian vein; Apical lymph nodes


Operating lamp
Suction machine
Intravenous fluids
Chief surgeon
Piped anesthetic gases
Assistant surgeon
Monitor
Circulating nurse
Anesthesiologist
Operating table
Scrub nurse
Instrument table


Key
l. ligament
ll. ligaments
m. muscle
mm. muscles
t. tendon
tt. tendons
skin
temporalis m.
orbicularis oculi muscle
orbital part
palpebral part
procerus m.
nasalis m.
zygomaticus major m.
masseter m.
buccinator m.
depressor anguli oris m.
depressor labii inferioris m.
thyrohyoid m.
omohyoid muscle (superior belly)
sternohyoid m.
levator scapulae m.
trapezius m.
scalenus medius m.
subscapular m.
biceps brachii muscle
long head
short head
teres major m.
latissimus dorsi m.
deltoid m.
triceps brachii muscle
long head
lateral head
medial head
biceps brachii m.
brachialis m.
brachioradialis m.
bicipital aponeurosis
flexor carpi radialis
supinator m.
extensor carpi radialis longus m.
flexor digitorum profundus m.
flexor carpi ulnaris m.
pronator teres m.
flexor digitorum superficialis m.
flexor pollicis longus m.
flexor carpi radialis t.
gluteus medius m.
tensor fasciae latae m.
sartorius m.
gluteus minimus m.
rectus femoris m.
iliopsoas m.
pectineus m.
vastus intermedius m.
gracilis m.
vastus medialis m.
rectus femoris m.
iliotibial tract
biceps femoris m.
lateral patellar retinaculum
medial patellar retinaculum
patellar l.
peroneus longus m.
tibialis anterior m.
soleus m.
interosseous membrane
extensor digitorum longus m.
extensor hallucis longus m.
peroneus longus t.
peroneus brevis m.
tibialis anterior t.
peroneus tertius m.
inferior extensor retinaculum
extensor digitorum brevis m.
galea aponeurotica
frontalis m.
corrugator supercilii m.
levator labii superioris alaeque nasi m.
auricularis muscles:
superior
anterior
levator labii superioris m.
zygomaticus minor m.
levator anguli oris m.
risorius m.
depressor septi m.
orbicularis oris m.
mentalis m.
platysma m.
sternocleidomastoid m.
deltoid m.
coracobrachialis m.
latissimus dorsi m.
long head
medial head
lateral head
triceps brachii muscle
biceps brachii m.
brachialis m.
bicipital aponeurosis
biceps brachii t.
supinator m.
brachioradialis m.
extensor carpi radialis longus m.
pronator teres m.
flexor carpi radialis m.
palmaris longus m.
flexor carpi ulnaris m.
abductor pollicis longus m.
flexor pollicis longus m.
pronator quadratus m.
flexor retinaculum
palmar aponeurosis
flexor digitorum superficialis m.
gluteus medius m.
tensor fasciae latae m.
sartorius m.
pectineus m.
brevis
longus
magnus
adductor muscles
vastus lateralis m.
iliotibial tract
rectus femoris m.
gastrocnemius m.
tibialis anterior m.
extensor digitorum longus m.
peroneus longus m.
soleus m.
peroneus brevis m.
extensor hallucis longus m.
superior extensor retinaculum
extensor digitorum longus tt.
peroneus tertius t.
Key
1 subclavius m.
2 external intercostal mm.
3 pectoralis minor m.
4 serratus anterior m.
5 pectoralis major m.
6 rectus sheath (anterior layer)
7 rectus abdominis m.
8 external abdominal oblique m.
9 internal abdominal oblique m.
10 transversus abdominis m.
11 rectus sheath (posterior layer)
12 arcuate line
13 cremaster m.
14 linea alba
15 aponeurosis of external abdominal oblique m.



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Cancel Capture

Tagged: anatomy muscles of the body quiz, muscles diagram of the human body, muscular anatomy

BarCharts, Inc.®

THE *WORLD'S #1* QUICK REFERENCE GUIDE

Quick Study® HEALTH

VITAMINS & MINERALS

NUTRIENTS / Dosage	TYPE	NATURAL SOURCES	BEST IF TAKEN WITH	DEFICIENCY SYMPTOMS	TOXICITY SYMPTOMS
Calcium 1,000-1,500 mg	Mineral	Skim milk, nonfat yogurt, kale, cheeses, collard greens, canned salmon & sardines with bones, mustard greens, broccoli, figs, calcium-fortified orange juice, carob, oats, prunes, asparagus, sesame seeds, soybeans, tofu, watercress, whey	Boron, essential fatty acids, lysine, magnesium, manganese, phosphorus, vitamins A, C, D, F, cobalt, folic acid, iron, zinc	Muscle spasms, rickets, osteomalacia, osteoporosis	Generally considered non-toxic. Calcium supplements are not recommended for those individuals with kidney disease or a history of kidney stones.
Chromium 200-600 mcg	Trace Mineral	Brewer's yeast, broccoli, ham, grape juice, brown rice, cheese, whole grains, dried beans, calves liver, chicken, corn, corn oil, dairy products, eggs, potatoes, mushrooms, wine, beer	None required	Rare: alterations in metabolism of fats, carbohydrates, proteins, amino acids	Generally considered non-toxic. Exposure to industrially inhaled chromium has been linked to lung cancer.
Copper 0.5-2 mg	Trace Mineral	Shellfish, nuts, seeds, cocoa powder, beans, whole grains, mushrooms, calves liver, avocados, barley, beets, broccoli, lentils, oats, oranges, radishes, raisins, salmon, green leafy vegetables	Cobalt, folic acid, iron, zinc	Osteoporosis, inability of body to manufacture collagen, fatigue, baldness, slow growth, slows nervous system development, retardation	Nausea, vomiting, abdominal pain, diarrhea, headaches, metallic taste, hemolytic anemia
Fluoride 1.5-4 mg	Trace Mineral	Fluoridated water, tea, canned salmon, mackerel, kidney, liver	None required	Dental caries, brittle bones	Mottled teeth, osteomalacia, osteoporosis
Folic Acid 400-1,200 mcg	Water Soluble	Fortified cereals, pinto beans, navy beans, asparagus, spinach, broccoli, okra, brussels sprouts, barley, beef, bran, brown rice, brewer's yeast, cheese, chicken, dates, green leafy vegetables, lamb, legumes, lentils, liver, milk, mushrooms, oranges, split peas, pork, tuna, whole grains	Multivitamin	Anemia, irritability, weakness, sleep disturbances, pallor, sore & reddened tongue	Generally considered non-toxic.
Iodine 0-150 mcg (Most individuals) 150-300 mcg (For those living in low-iodine areas or for those with low iodine diets.)	Mineral	Iodized salt, shellfish, saltwater fish, milk, seaweed	Iron, manganese, phosphorus	Growth and sexual development can be delayed in children; goiter	Generally considered non-toxic, if under 1,000 mcg/day. High doses can cause headaches, metallic taste in mouth and rash. Doses over 20,000 mcg/day have been associated with iodide goiter.
Iron 15-25 mg (Men) 18-30 mg (Women)	Mineral	Iron fortified cereals, beef, baked potatoes, clams, pumpkin seeds, soybeans, eggs, fish, liver, green leafy vegetables, whole grains, nuts, avocados, beets, brewer's yeast, dates, peaches, pears, lentils, dried prunes, raisins, sesame seeds	None required	Anemia, dry, coarse hair, dysphagia, dizziness, fatigue, hair loss, cracked lips or tongue, nervousness, slowed mental response, pallor	Generally considered non-toxic, if under 75mg/day. High doses can cause abdominal cramps, vomiting, and diarrhea. Severe overdoses of iron can be considered fatal if medical attention is not sought.
Magnesium 500-750 mg	Mineral	Brown rice, avocados, spinach, haddock, oatmeal, navy beans, lima beans, broccoli, yogurt, bananas, baked potatoes, apples, apricots, brewer's yeast, tofu, cantaloupes, grapefruit, green, leafy vegetables, lemons, nuts, salmon, sesame seeds, wheat	Calcium, phosphorus, potassium, vitamins B6 (pyridoxine), C, D	Sleep disturbances, irritability, rapid heartbeat, confusion, muscle spasms, GI upset	Rarely toxic. Symptoms may include diarrhea, fatigue, and arrhythmia..
Manganese 15-30 mg	Trace Mineral	Canned pineapple juice, wheat bran, wheat germ, whole grains seeds, nuts, cocoa, shellfish, tea, dairy products, apples, apricots, avocados, bananas, brewer's yeast, cantaloupe, grapefruit, green, leafy vegetables, peaches, figs, salmon, soybeans, tofu	Calcium, iron, vitamin B complex, vitamin E	Rare: atherosclerosis, confusion, tremors, elevated cholesterol levels, impaired vision & hearing, skin rash, irritability, increased blood pressure, pancreatic damage, sweating, increased heart rate, mental impairment, grinding of teeth	Generally considered non-toxic. Exposure to industrially inhaled manganese has been linked to psychiatric and nervous disorders.
Molybdenum 75 mcg	Trace Mineral	Beans, whole grains, cereals, milk, milk products, dark green, leafy vegetables, legumes, peas, meats	None required	Rare: increased heart rate, mouth & gum disorders, impotence in older males, increased respiratory rate, night blindness	Generally considered non-toxic.
Phosphorus 1200 mg	Mineral	Halibut, non-fat yogurt, salmon, skim milk, chicken breast, extra lean ground beef, oatmeal, lima beans, broccoli, asparagus, corn, dairy products, eggs, dried fruits, highly carbonated beverages, legumes, nuts, sesame, pumpkin, sunflower seeds	Calcium, iron, manganese, sodium, vitamin B6 (pyridoxine)	Fatigue, irritability, decreased appetite, bone pain, weakness, skin sensitivity	Rarely toxic. Symptoms may include brittle bones related to loss of calcium (osteoporosis).
Potassium 3,500 mg	Trace Mineral	Dried apricots, baked potatoes	None required	Dry skin, acne, chills, diarrhea, impaired cognitive function, muscle spasms, arrythmia, edema,decreased reflex response, thirst, glucose intolerance, growth retardation, insomnia, elevated cholesterol, decreased blood pressure	Rarely toxic. Symptoms may include arrythmia & heart failure (doses exceeding 18gm/day).
Selenium 100-400 mcg (Those living in low-selenium areas, i.e.: coastal & glaciated regions.) 50-200 mcg (Those living in high-selenium areas.)	Mineral	Lobster, brazilian nuts, shellfish, whole grains, organ meats, brown rice, poultry, broccoli, dairy products, onions, salmon, tuna, torula yeast, vegetables, wheat germ, wheat grains	None required	Muscle weakness, linked to cancer & heart disease, fatigue, growth retardation, elevated cholesterol levels, susceptibility to infection, sterility	Rarely toxic. Symptoms may include garlic breath, brittle hair & nails, irritability, liver & kidney impairment, metallic taste in mouth, dermatitis, and jaundice.
Sodium 2,400 mg	Trace Mineral	Cheese, most meats, especially ham & bacon, canned soups, canned vegetables, canned tuna, cereals, bread, cabbage, milk, sardines	Calcium, potassium, vitamin D, sulfur	Nausea, vomiting, fatigue, abdominal cramps, dehydration, confusion, depression, dizziness, palpitations, headaches, impaired taste, low blood pressure, seizures	Edema, elevated blood pressure, potassium deficiency, diseases of the liver & kidneys

continued on the next page

KEY: IU - International Unit **qd** - every day **qh** - every hour **qweek/month** - once a week/month **bid/tid/qid** - two/three/four times daily **WF** - with food **ADOL** - as directed on label

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Vitamin A 5,000-50,000 IU	Fat Soluble	Carrots-raw & juiced, pumpkins, yams, tuna, cantaloupe, mangos, turnip, beet greens, butternut squash, spinach, fish, eggs	Choline, vitamins C, D, E, essential fatty acids, zinc	Poor night vision, macular degeneration, increased risk of cataracts, dry skin. Hearing, taste, smell, nerve damage	Nausea & vomiting, headaches, insomnia, dry skin, joint pain, constipation
Vitamin B1 *Thiamine* 25-300 mg	Water Soluble	Rice bran, pork, beef, ham, fresh peas, beans, breads, wheat germ, oranges, enriched pastas, cereals	Manganese, vitamin C, E, vitamin B complex	Mild: appetite & weight loss, nausea, vomiting, fatigue, nervous system problems Severe: beri beri, muscle weakness, decreased DTR, edema, enlarged heart	Generally non-toxic.
Vitamin B2 *Riboflavin* 25-300 mg	Water Soluble	Poultry, fish, fortified grains & cereals. Broccoli, turnip greens, asparagus, spinach, yogurt, milk, cheese	Vitamin B complex, vitamin C	Mild: cracks & sores to corners of the mouth & tongue, red eyes, skin lesions, dizziness, hair loss, inability to sleep, sensitivity to light, and poor digestion. Severe (rare): anemia, nerve disease	Generally non-toxic.
Vitamin B3 *Niacin* 25-300 mg	Water Soluble	Chicken breast, tuna, veal, beef liver, fortified breads & cereals, brewer's yeast, broccoli, carrots, cheese, corn flour, dandelion greens, dates, eggs, fish, milk, peanuts, pork, potatoes, tomatoes	Vitamin B complex, vitamin C	Mild: canker sores, diarrhea, dizziness, fatigue, halitosis, headaches, indigestion, inability to sleep, loss of appetite, dermatitis Severe: pellagra	Nausea, vomiting, abdominal cramps, diarrhea, flushing. Severe: Liver damage, irregular heart rate, rash to large portions of the body, gouty arthritis
Vitamin B5 *Pantothenic Acid* 25-500 mg	Water Soluble	Whole grains, mushrooms, salmon, brewer's yeast, fresh vegetables, kidney, legumes, liver, pork, royal jelly, saltwater fish, torula yeast, whole rye & whole wheat flour	Vitamins A, C, E	Rare: Nausea, vomiting, fatigue, headache, tingling in the hands, sleep disturbances, abdominal pains & cramps	Generally considered non-toxic.
Vitamin B6 *Pyridoxine* 1.5-2 mg	Water Soluble	Bananas, avocados, chicken, beef, brewer's yeast, eggs, brown rice, soybeans, whole wheat, peanuts, walnuts, oats, carrots, sunflower seeds	Potassium, vitamin C, vitamin B complex	Anemia, seizures, headaches, nausea, dry & flaky skin, sore tongue, cracks on mouth, vomiting	Generally considered non-toxic. High doses (2000-6000 mg/day) can cause nerve disorders.
Vitamin B12 *Cyanocobalamin* 25-500 mcg	Water Soluble	Clams, ham, cooked oysters, king crab, herring, salmon, tuna, lean beef, liver, blue cheese, camembert & gorgonzola cheese	None required	Unsteady gait, chronic fatigue, constipation, depression, digestive disturbances, dizziness, drowsiness, liver enlargement, hallucinations, headaches, inflammation of the tongue, irritability, mood swings, nerve disorders, palpitations, pernicious anemia, tinnitus, spinal cord degeneration	Generally considered non-toxic.
Vitamin C 60-5,000 mg	Water Soluble	Broccoli, cantaloupe, kiwifruit, oranges, pineapple, peppers, pink grapefruit, strawberries, asparagus, avocados, collards, dandelion greens, kale, lemons, mangos, onions, radishes, watercress	Bioflavanoids, calcium, magnesium	Mild: poor wound healing, bleeding gums, easily bruised, nosebleeds, joint pain, lack of energy, susceptibility to infection. Severe: scurvy	Generally considered non-toxic. High doses (5,000 mg and up/day) can cause abdominal bloating and diarrhea.
Vitamin D 400-800 IU	Fat Soluble	Sun exposure, sardines, salmon, mushrooms, eggs, fortified milk, fortified cereals, herring, liver, tuna, cod liver oil, margarine	Calcium, choline, vitamins A & C, phosphorus, essential fatty acids	In infants, irreversible bone deformities. In children: rickets, delayed tooth development, weak muscles, softened skull In adults: osteomalcia, osteoporosis, hypocalcemia	Nausea & vomiting, headaches, constipation, diarrhea, fatigue, loss of appetite, excessive thirst & urination, protein in urine, liver & kidney damage
Vitamin E 30-1,200 IU	Fat Soluble	Vegetable & nut oils, including soybean, corn, safflower, spinach, whole grains, wheat germ, sunflower seeds	Essential fatty acids, vitamins A, B1, C, manganese, selenium	Rare symptoms may include anemia and edema.	Generally non-toxic; but stomach upset, dizziness and diarrhea can occur.
Vitamin K 80 mcg	Fat Soluble	Green leafy vegetables including spinach, kale, cauliflower, broccoli	None required	Rare, except in newborns, where bleeding tendencies are possible. Elevated levels of vitamin K can interfere with the effects of anti-coagulants.	Generally non-toxic; but a type of jaundice may occur in premature infants.
Zinc 22.5-50 mg	Mineral	Cooked oysters, beef, lamb, eggs, whole grains, nuts, yogurt, fish, legumes, lima beans, liver, mushrooms, pecans, pumpkin & sunflower seeds, sardines, soybeans, poultry	Calcium, copper, phosphorus, vitamin B6 (pyridoxine)	Change in taste & smell, nails can become thin & peel, acne, delayed sexual maturation, hair loss, elevated cholesterol, impaired night vision, impotence, growth retardation, increased susceptibility to infection	Nausea, vomiting, abdominal pain, impaired coordination, fatigue

Vitamin and Mineral Supplementation for Cardiovascular Disorders

ARTERIOSCLEROSIS/ ATHEROSCLEROSIS	
Beta-carotene	15,000 IU qd
Calcium	1,500 mg qh
Magnesium	750 mg qh
Selenium	200 mcg qd
Vitamin A	25,000 IU qd
Vitamin C	100-4,000 mg 5x day
Vitamin D	400 mg qd
Vitamin E	200 IU qd, increase by 200 IU q week, until up to 1,000 IU qd
COMMON HEART DISORDERS	
Calcium	1,500-2,000 mg qd, in divided dosages, after meals and qhs
Magnesium	750-1,000 mg qd, in divided dosages, after meals and qh
Potassium	2,000 mg qd
Selenium	200 mcg qd
Vitamin E	100-200 IU qd and increase by 100-200 IU qweek, until 800-1,000 IU are being taken qd. (Do not exceed 400 IU, if on anticoagulant therapy.)

INCLUDES: *Aneurysm, Angina pectoris, Arrhythmia, Cardiac arrest, Cardiomegaly, Cardiomyopathy, Carditis, Congestive heart failure, Endocarditis, Ischemic heart disease*

HEART ATTACK (MI)	
Calcium	1,500 mg qd
Chromium	100 mcg qd
Copper	3 mg qd
Folic Acid	400 mcg qd
Magnesium	1,000 mg qd, in divided dosages, after meals and qh.
Selenium	300 mcg qd
Vitamin A	ADOL
Vitamin B complex	50 mg tid
Vitamin B1	500 mg tid WF
Vitamin B12	2,000 mcg qd
Vitamin C	3,000-6,000 mg qd
Vitamin E	100-200 IU qd and increase by 100-200 IU qweek, until 800-1000 IU are being taken qd. (Do not exceed 400 IU, if on anticoagulant therapy.)
Zinc	50 mg qd
HIGH BLOOD PRESSURE / HYPERTENSION	
Calcium	1,500-3,000 mg qd
Magnesium	750-1,000 mg qd
Selenium	200 mcg qd
Vitamin C	1,000-2,000 mg qd
Vitamin E	100 IU qd, and add 100 IU qmonth, until you reach 400 IU qd
HIGH CHOLESTEROL/HYPERLIPEDEMIA	
Calcium	ADOL
Vitamin B complex	ADOL
Vitamin B1	ADOL
Vitamin B3	300 mg qd
Vitamin C	1,500-4,000 mg bid

Vitamin and Mineral Supplementation for Gastrointestinal Disorders

APPETITE-POOR	
Calcium	1,500 mg qd
Copper	3 mg qd
Magnesium	750 mg qd
Vitamin A	25,000 IU qd
Vitamin B complex	100 mg qd before meals
Zinc	80 mg qd
CELIAC DISEASE	
Beta Carotene	10,000 IU qd
Copper	3 mg qd
Folic Acid	ADOL
Vitamin A	15,000 IU qd
Vitamin B complex	100 mg tid
Vitamin B12	ADOL
Vitamin E	400 IU qd
Vitamin K	ADOL
Zinc lozenges	1-15 mg 5 x day
CONSTIPATION	
Vitamin C	1,000-4,000 mg 5 x day
CROHN'S DISEASE	
Folic Acid	200 mcg qd
Vitamin B complex	100 mg tid
Vitamin B12	200 mcg qd
Vitamin C	1,000 mg tid
Vitamin K	ADOL
Zinc	50 mg qd
DIARRHEA	
Potassium	3,000 mg qd

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Symbol	Class Description	Symbol means that the material:
	Compressed Gas (Class A)	▪ poses an explosion danger because the gas is being held in a cylinder under pressure ▪ may cause its container to explode if heated ▪ may cause its container to explode if dropped
	Combustible and Flammable Material (Class B)	▪ is one that will burn and is consequently a fire hazard (*i.e.*, is combustible) ▪ may catch fire at relatively low temperatures (*i.e.*, is flammable) ▪ may ignite spontaneously in air or release a flammable gas on contact with water
	Oxidizing Material (Class C)	▪ may react violently or cause an explosion when it comes into contact with combustible materials ▪ may burn skin and eyes upon contact
	Poisonous Material: Immediate Toxic Effects (Class D1)	▪ is a potentially fatal poisoning substance ▪ may be immediately fatal or cause permanent damage if it is inhaled or swallowed or enters the body through skin contact
	Poisonous Material: Other Toxic Effects (Class D2)	▪ is a poisonous substance that is not immediately hazardous to health ▪ may cause death or permanent damage as a result of repeated exposure over time (*e.g.*, cancer, birth defects or sterility) ▪ may be an irritant
	Biohazardous Infectious Material (Class D3)	▪ may cause a serious disease resulting in illness or death ▪ may produce a toxin that is harmful to humans
	Corrosive Material (Class E)	▪ causes severe eye and skin irritation upon contact ▪ causes severe tissue damage with prolonged contact ▪ may be harmful if inhaled
	Dangerously Reactive Material (Class F)	▪ is very unstable ▪ may react with water to release a toxic or flammable gas ▪ may explode as a result of shock, friction, or increase in temperature ▪ may explode if heated in a closed container

Workplace Hazardous Materials Information System (WHIMIS)

HAZARD SYMBOLS

Compressed Gas

Explosion Danger - Gas under pressure.
May explode if heated, punctured or dropped.

Health Hazard

May cause allergic reaction, cancer, birth defects, damage organs or harm fertility or unborn children.

Flammable Material

Potential Fire Hazard.
Catches fire spontaneously if exposed to air or water or when exposed to heat sparks or flames or as a result of friction.

Harmful or Fatal

Acute Toxicity.
Potentially fatal poisonous substance if inhaled, swallowed, or through skin contact, even in small amounts.

Oxidizing

Fire and/or Explosion Risk in the presence of flammable or combustible material.
May cause fire or enhance the combustion of other materials

Harmful

to skin, eyes or respiratory system. Fatal in large quantities. Hazardous to the Ozone Layer.

Explosion Hazard

Risk of explosion due to fire, shock, friction, heat or puncture

Harmful to the Environment

and/or aquatic life with long-lasting effects.

Corrosive

Causes severe Skin Burns & Eye Damage.
Is corrosive to metal.

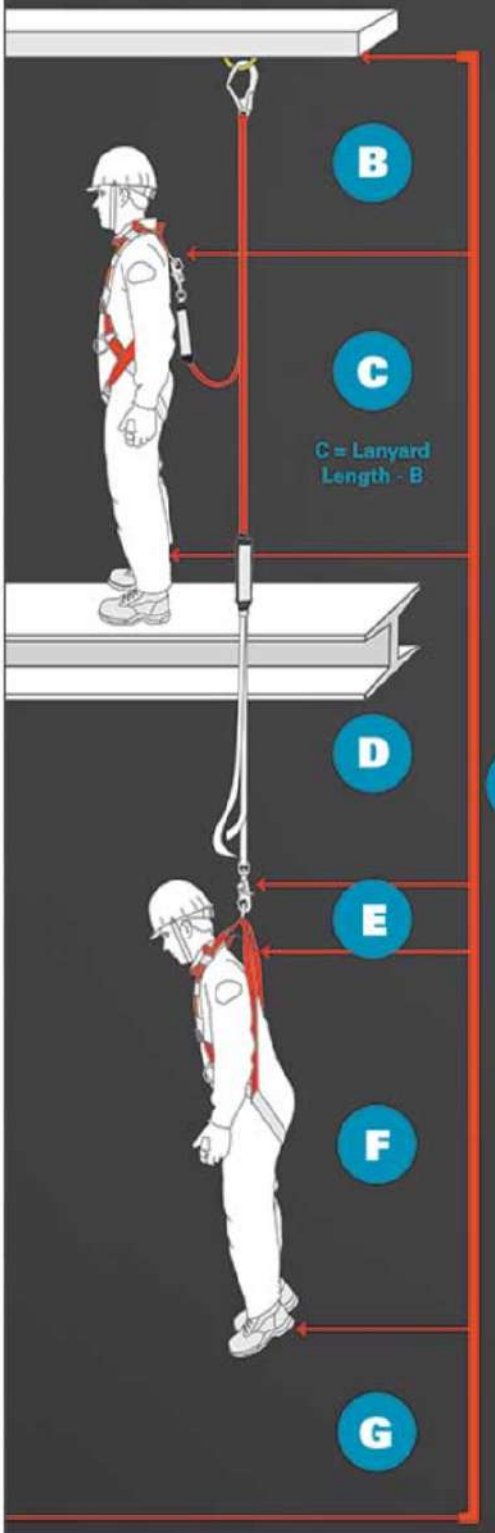
Biohazardous Infectious Materials

For organisms or toxins that can cause serious disease in people or animals resulting in illness or death.

ESTIMATING CLEARANCES

ENERGY ABSORBING LANYARDS

This poster illustrates two common, but different, methods used to estimate clearance. Method 1 uses the anchor location as the calculation starting point. Method 2 uses the platform as the calculation starting point. Use the method where the starting point (anchor or platform) is a known measurement, but either method is acceptable.



A HEIGHT TO ANCHOR OR PLATFORM
AVAILABLE CLEARANCE. This measurement is a known measurement, usually from the anchorage (Method 1) or the walking surface (Method 2).

B ANCHOR LOCATION
LOCATION OF ANCHOR ABOVE D-RING ONLY. By evaluating how the lanyard is attached (above or below the workers D-ring), the free fall distance can be estimated. The lanyard anchored above the D-ring reduces the free fall distance and lanyards anchored below the D-ring increase the free fall distance. The slack in the lanyard is equal to the free fall distance (C).

C FREE FALL DISTANCE
ANCHOR LOCATION & LANYARD LENGTH. The free fall distance is the vertical distance the worker travels before the system begins to engage. In these examples, the worker will fall the length of the lanyard minus B.

D ENERGY ABSORBER DEPLOYMENT
ANSI Z359.13. Gravitec recommends using ANSI Z359.13 compliant energy absorbers that have a predictable deployment distance (6 ft FF = 48")(12 ft FF = 60") and a capacity of 130-310 lbs worker. For these estimates, it is recommended to use the full deployment distance of the energy absorber.

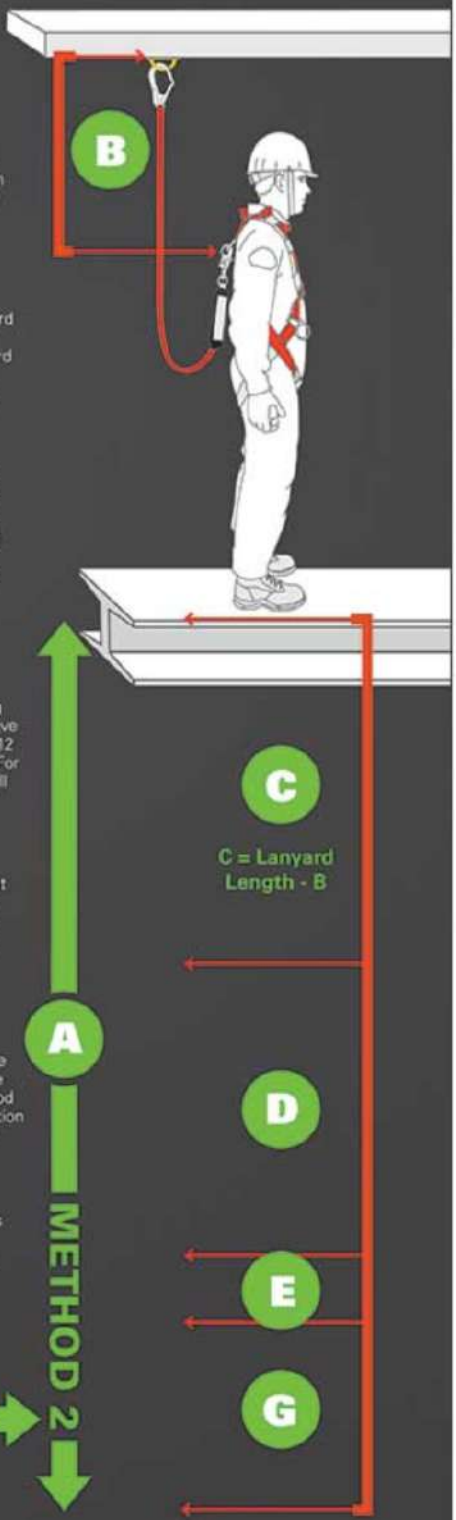
E HARNESS STRETCH
TYPICALLY 1-2.5 FEET. Even the best-fit harness will add length to the fall distance. Most recommend adding a foot to the calculation, but ill-fitted or stretch-type harnesses can add more.

F WORKER HEIGHT
USED IN METHOD 1 ONLY.
Approximately a foot less than the worker's height as this is where they are connected. The worker height is added using method 1, since the worker is hanging below the anchor. Using Method 2, the worker's height is not added into the equation since we are following their feet through the fall.

G SAFETY MARGIN
2 FT RECOMMENDED. These numbers are estimates, which means it is a good idea to add two or three extra feet as a margin of safety.

METHOD 1
(A) must be = or greater than (B+C+D+E+F+G)

METHOD 2
(A) must be = or greater than (C+D+E+G)



REGULATIONS

OSHA 1910.140
(d)(2)(ii) Personal fall arrest systems are rigged in such a manner that the employee cannot free fall more than 6 feet (1.8 m) or contact a lower level.

OSHA 1926.502
(d)(16)(iii) Personal fall arrest systems, when stopping a fall, shall be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;

STANDARDS

ANSI Z359.13 – 2013
Personal Energy Absorbers and Energy Absorbing Lanyards

3.2.4.1 (c) FF energy absorbing lanyards shall have an average arrest force no greater than 900 pounds (4 kN) and a maximum deployment distance of 48 inches (1.2 m) without exceeding 1,800 pounds (8 kN) maximum arrest force.

3.2.4.2 (c) FF energy absorbing lanyards shall have an average arrest force no greater than 1,350 pounds. (6 kN) and a maximum deployment distance of 60 inches (1.5 m) without exceeding 1,800 pounds (8 kN) maximum arrest force.

GRAVITEC

PROTECTING WORKERS AT HEIGHT

DONNING, ADJUSTING & INSPECTING A

FULL BODY HARNESS

A Full Body Harnesses (FBH) is an integral part of a fall arrest system. Worn and used properly, a FBH keeps the worker in an upright position, distributes forces to the pelvic area and provides a window of time for rescue.

DORSAL D-RING
The dorsal D-ring should be located between the shoulder blades, but not too high to be uncomfortable.

CHEST STRAP
The chest strap should be located on the upper chest and tight enough to prevent the shoulder straps from sliding off the shoulders.

WEBBING ENDS
Ends of webbing should be of equal length and held in place by keepers – **DO NOT CUT**

SUB-PELVIC
The sub-pelvic strap should be located just below the buttocks

LEG LOOPS
Leg loops should be snug, but not uncomfortable.

DONNING A FULL BODY HARNESS STEP BY STEP

1 UNTANGLE & INSPECT THE HARNESS:

Locate the dorsal D-ring and shake the harness out. Lay the harness flat on a clean area of the floor or hang it from a hook. Untangle any twists and knots by running your hands down the webbing. Disconnect any connecting buckles. Inspect the harness for cuts, tears, chemical damage, or excessive abrasion. Look for any impact indicators on the dorsal D-ring plate or leg loop grommets. Inspect the hardware, D-rings, and buckles for corrosion, cracks, or deformities. Never use a harness that does not pass inspection.

2 DON THE HARNESS:

Put the harness on. Most "vest style" harnesses go on like a jacket with arms going between the shoulder straps and the back straps.

ADJUST THE SUB-PELVIC STRAP:

Using the adjustment buckles located on the front vertical straps, raise or lower the sub-pelvic strap so it is located just below the buttocks by moving webbing through the adjustment buckle. The ends of the adjustment straps should be of equal length after the sub-pelvic strap has been adjusted.

3 CONNECT & ADJUST THE LEG LOOPS:

Reach between the legs and grab the respective leg loop and check that there are no twists. Connect the leg loop and adjust it to fit. The leg loop should be snug but not uncomfortable. Connect and adjust the opposite leg loop in the same manner. Both leg loops should be the same length after adjustment.

4 CONNECT & ADJUST THE CHEST STRAP:

Connect the chest strap and adjust its length and height so it prevents the shoulder straps from coming off the shoulders. The chest strap should be perpendicular to the shoulder straps and located on the upper chest area.

5 ADJUST THE DORSAL D-RING:

The dorsal D-ring should be located between the shoulder blades. Raise or lower the dorsal D-ring accordingly.

CHECK OVERALL FIT & BUDDY CHECK:

Secure loose ends of webbing with keepers. Check for twists, misaligned webbing, or disconnected buckles. It is good practice to have a co-worker perform a buddy check. Checking the location of the sub-pelvic strap and dorsal d-ring, the tension on the leg loops and shoulder straps, loose webbing ends and the overall fit of the harness.

INSPECT THE FULL BODY HARNESS

- ***Webbing:*** cuts, tears, holes, welding slag, chemical damage, soiling, overspray, UV damage, abrasion.
- ***Stitch Patterns:*** damaged patterns, broken, pulled or loose stitches, abrasion.
- ***D-Rings & Buckles:*** deformity, corrosion, nicks, smooth operation, springs intact.
- ***Impact Indicators:*** designed indicators deployed, broken D-ring plate, heat signatures, oblong grommets.
- ***Label:*** manufacturer, date of manufacture, model, serial, warnings.

REGULATIONS

OSHA – Full Body Harnesses

- 1910.66 App C (4)(1)(ii) & 1926.502(d)(16)(ii) – Full arrest systems must limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness.
- 1910.66 App C (4)(4) & 1926.502(d)(17) –The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.
- 1926.502(d)(16) Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

STANDARDS

ANSI Z359.1 - 2007 – Full Body Harnesses

- Straps shall be synthetic material, be a minimum width of 1-1/8 inches and have an MBS of 5,000 pounds.
- The harness shall support the body across the lower chest, over the shoulders, and around the thighs. The harness shall prevent fallout. The fall arrest attachment shall be located at the dorsal position.
- Front-mounted attachment elements shall be used with a maximum free fall distance to two feet and a maximum arrest force to 900 pounds.
- Static Strength Testing. A load of 5,000 pounds shall be applied to the harness dorsal D-ring in a direction simulating a feet-first fall for a period of one minute.
- Dynamic Performance Testing. Drop the test torso and harness 3.3 feet into the static test lanyard. The torso is to remain suspended for five minutes. The dynamic test is to be done twice, once feet first and once head first.

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THE A B C D OF FALL PROTECTION

The ***A, B, C, D of Fall Protection*** covers the fundamental requirements of every personal fall protection system. Use it as a guide when evaluating your fall protection requirements, however, always consult a fall protection specialist if you're unsure of any aspect of fall protection or fall protection equipment.

A

ANCHORAGE

Anchorage devices provide a secure point of attachment (to an existing structure) for the fall arrest system. Anchorage devices can be permanent or temporary and vary to suit the type of structure available.

B

BODY SUPPORT

Full body harnesses connect the worker to the fall arrest system. They are specially designed to protect the worker against serious injury in the event of a fall whilst also remaining comfortable to wear.

C

CONNECTOR

Connectors are devices that connect the full body harness to the anchorage system. They can be single products or multiple devices working together.

D

DESCENT/ RESCUE

Decent & Rescue systems enable the retrieval of an injured or incapacitated worker. In the event of a rescue, this equipment facilitates rapid recovery of the worker without endangering other workers in the process.

THE ABC'S OF PERSONAL FALL PROTECTION

IOWA STATE UNIVERSITY
Environmental Health and Safety

When working at heights, it can be challenging to remember the basics of personal fall protection systems. The ABC's of fall protection is an easy way to remember the basics of personal fall protection systems. The ABC's include the three components most often used together when utilizing a personal fall protection system.

A Anchor Point

An **anchor point** is a secure point of attachment to a structure.

Anchoring devices come in a variety of forms and can be temporary or permanent.

B Body Harness

A full **body harness** allows for maximum range of motion while still providing body support in the event of a fall.

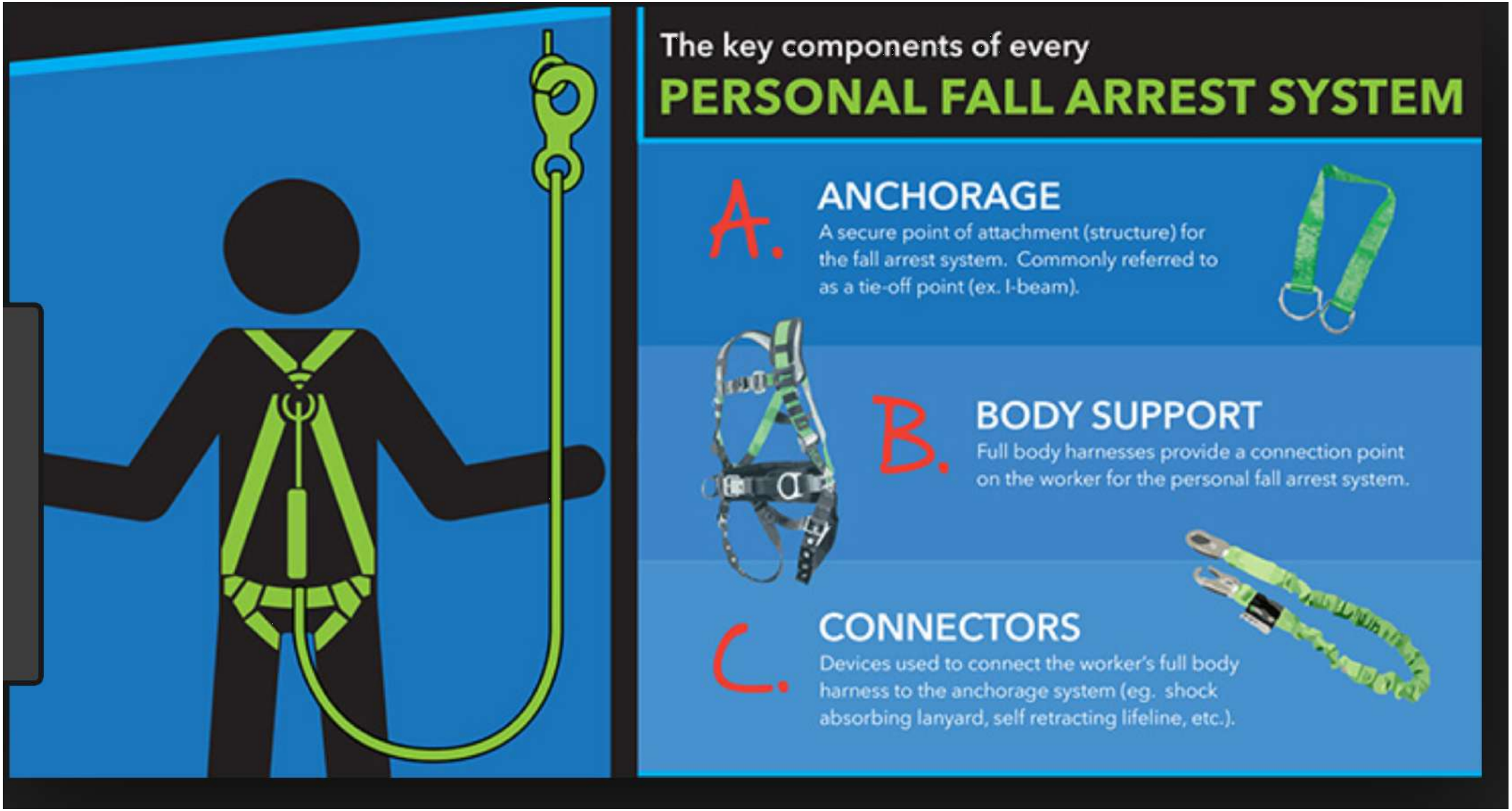
They're designed to distribute the force of a fall through-out the trunk of the body.

C Connector

The **connector** attaches the body harness to the anchor point.

They come in many forms, the most common being a fixed-length shock absorbing lanyard or a self-retracting lifeline.


STEP 1
STEP 2
STEP 3
STEP 4
STEP 5


The key components of every
PERSONAL FALL ARREST SYSTEM
A.
ANCHORAGE
A secure point of attachment (structure) for the fall arrest system. Commonly referred to as a tie-off point (ex. I-beam).
B.
BODY SUPPORT
Full body harnesses provide a connection point on the worker for the personal fall arrest system.
C.
CONNECTORS
Devices used to connect the worker's full body harness to the anchorage system (eg. shock absorbing lanyard, self retracting lifeline, etc.).

TYPES OF HARNESSES

DBI-SALA™ harnesses are available in different types, with various features, depending on their intended use.

MULTI-PURPOSE HARNESS

This type typically includes extra attachment points which allow work in a variety of situations. The belt and pad provide additional back lumbar support, positioning rings and tool carrying options.

WORK POSITIONING HARNESS

These harnesses have positioning D-rings located on the hips for use with pole straps or work positioning lanyards, which allow hands-free operation. Harnesses of this kind may include integral waist belts.

LADDER CLIMBING HARNESS

Harnesses with a frontal attachment point, for connection to permanent ladder safety systems.

DESCENT CONTROL HARNESS

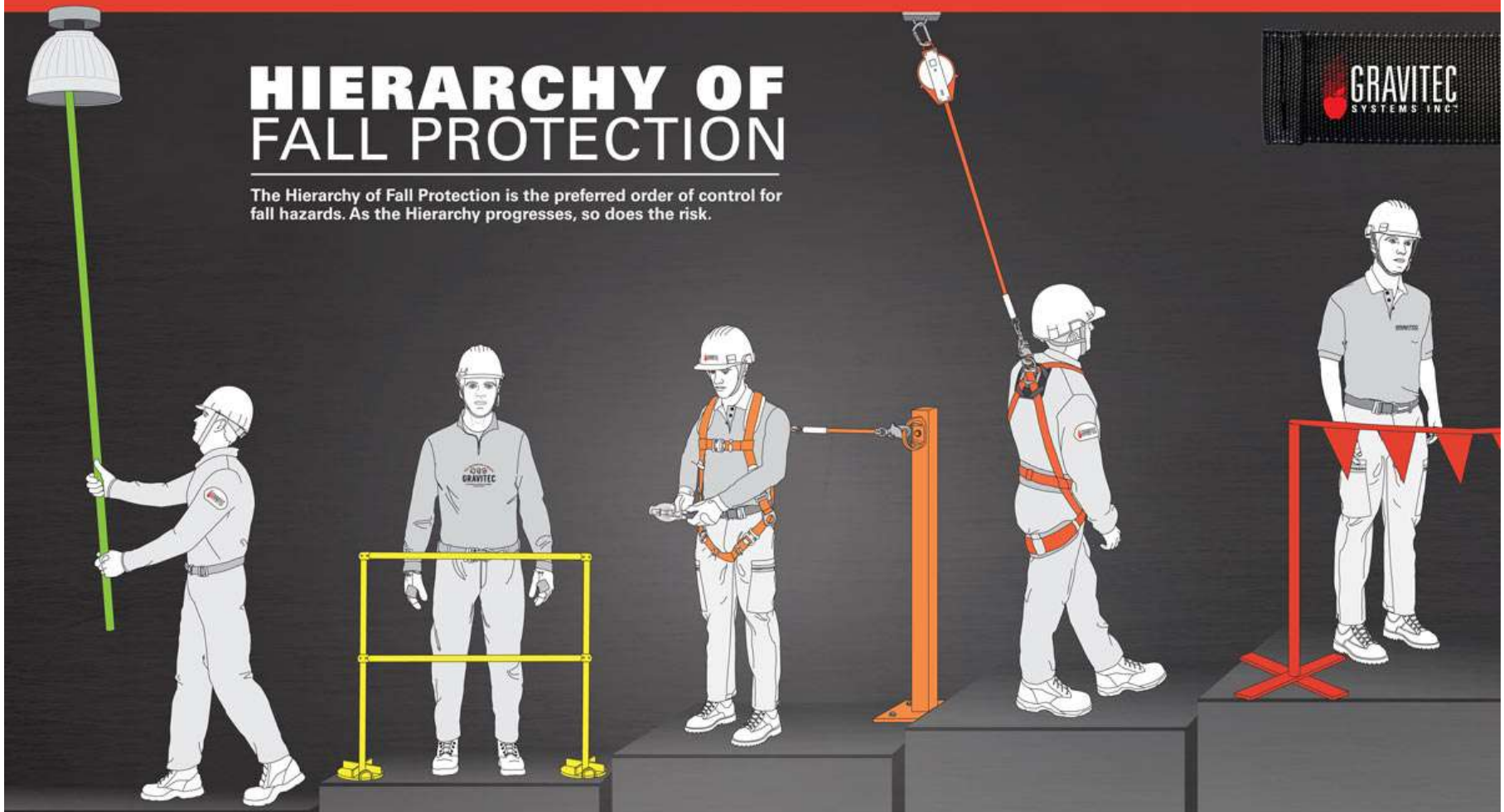
These harnesses typically have frontal attachment points for use with descent control devices.

CONFINED ENTRY/RETRIEVAL HARNESS

One attachment point located on each shoulder strap facilitates upright retrieval from confined spaces.

HIERARCHY OF FALL PROTECTION

The Hierarchy of Fall Protection is the preferred order of control for fall hazards. As the Hierarchy progresses, so does the risk.



1 HAZARD ELIMINATION

Preferred solution is to eliminate exposure to the fall hazard.

2 PASSIVE FALL PROTECTION

Physical barriers, like guardrails around unprotected edges and covers over holes.

3 FALL RESTRAINT SYSTEMS

Use personal protective equipment to restrict the worker's range of movement so they cannot fall.

* Training required

4 FALL ARREST SYSTEMS

Use personal protective equipment to arrest a fall within acceptable force and clearance margins.

* Training and rescue planning required

5 ADMINISTRATIVE CONTROLS

Least preferred solution is work practices or procedures that increase a worker's awareness of a fall hazard.

* Not recommended

Arduino Cheat Sheet V.02b

Mostly taken from the extended reference:
http://arduino.cc/en/Reference/Extended
Gavin Smith – Robots and Dinosaurs, The Sydney Hackspace

Structure
void **setup**() void **loop**()

Control Structures
```
if (x<5){ } else { }
switch (myvar) {
  case 1:
    break;
  case 2:
    break;
  default:
}
for (int i=0; i <= 255; i++){ }
while (x<5){ }
do { } while (x<5);
continue; //Go to next in do/for/while loop
return x; // Or 'return;' for voids.
goto      // considered harmful :-)
```

Further Syntax
// (single line comment)
/* (multi-line comment) */
#define DOZEN 12 //Not baker's!
#include <avr/pgmspace.h>

General Operators
= (assignment operator)
+ (addition) - (subtraction)
* (multiplication) / (division)
% (modulo)
== (equal to) != (not equal to)
< (less than) > (greater than)
<= (less than or equal to)
>= (greater than or equal to)
&& (and) || (or) ! (not)

Pointer Access
& reference operator
* dereference operator

Bitwise Operators
& (bitwise and) | (bitwise or)
^ (bitwise xor) ~ (bitwise not)
<< (bitshift left) >> (bitshift right)

Compound Operators
++ (increment) -- (decrement)
+= (compound addition)
-= (compound subtraction)
*= (compound multiplication)
/= (compound division)
&= (compound bitwise and)
|= (compound bitwise or)

Constants
HIGH | LOW
INPUT | OUTPUT
true | false
143 // **Decimal** number
0173 // **Octal** number
B11011111 //**Binary** (8-bits only)
0x7B // **Hex** number
7U // Force unsigned
10**L** // Force long
15**UL** // Force long unsigned
10.0 // Forces floating point
2.4e5 // 245,000

Data Types
void
boolean (0, 1, false, true)
char (e.g. 'a' -128 to 127)
unsigned char (0 to 255)
byte (0 to 255)
int (-32,768 to 32,767)
unsigned int (0 to 65535)
word (0 to 65535)
long (-2,147,483,648 to 2,147,483,647)
unsigned long (0 to 4,294,967,295)
float (-3.4028235E+38 to 3.4028235E+38)
double (currently same as float)
sizeof(myint) // returns 2 bytes

Strings
```
char S1[15];
char S2[8]={'a','r','d','u','i','n','o'};
char S3[8]={'a','r','d','u','i','n','o','\0'};
  //Included \0 null termination
char S4[ ] = "arduino";
char S5[8] = "arduino";
char S6[15] = "arduino";
```

Arrays
```
int myInts[6];
int myPins[] = {2, 4, 8, 3, 6};
int mySensVals[6] = {2, 4, -8, 3, 2};
```

Conversion
char() **byte**()
int() **word**()
long() **float**()

Qualifiers
static // persists between calls
volatile // use RAM (nice for ISR)
const // make read-only
PROGMEM // use flash

Digital I/O
pinMode(pin, [INPUT,OUTPUT])
digitalWrite(pin, value)
int **digitalRead**(pin)
//Write High to inputs to use pull-up res

Analog I/O
analogReference([DEFAULT,INTERNAL,EXTERNAL])
int **analogRead**(pin) //Call twice if switching pins from high Z source.
analogWrite(pin, value) // PWM

Advanced I/O
tone(pin, freqhz)
tone(pin, freqhz ,duration_ms)
noTone(pin)
shiftOut(dataPin, clockPin, [MSBFIRST,LSBFIRST], value)
unsigned long **pulseIn**(pin, [HIGH,LOW])

Time
unsigned long **millis**() // 50 days overflow.
unsigned long **micros**() // 70 min overflow
delay(ms)
delayMicroseconds(us)

Math
min(x, y) **max**(x, y) **abs**(x)
constrain(x, minval, maxval)
map(val, fromL, fromH, toL, toH)
pow(base, exponent) **sqrt**(x)
sin(rad) **cos**(rad) **tan**(rad)

Random Numbers
randomSeed(seed) // Long or int
long **random**(max)
long **random**(min, max)

Bits and Bytes
lowByte() **highByte**()
bitRead(x,bitn) **bitWrite**(x,bitn,bit)
bitSet(x,bitn) **bitClear**(x,bitn)
bit(bitn) //bitn: 0-LSB 7-MSB

External Interrupts
attachInterrupt(interrupt, function, [LOW,CHANGE,RISING,FALLING])
detachInterrupt(interrupt)
interrupts()
noInterrupts()

Libraries:

Serial.
begin([300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200])
end()
int **available**()
int **read**()
flush()
print()
println()
write()

EEPROM (#include <EEPROM.h>)
byte **read**(intAddr)
write(intAddr,myByte)

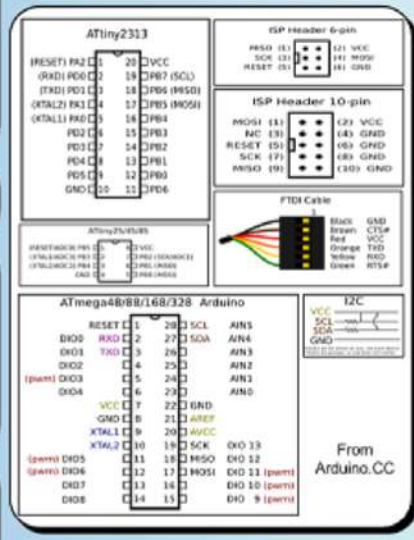
Servo (#include <Servo.h>)
attach(pin , [min_uS, max_uS])
write(angle) // 0-180
writeMicroseconds(uS) //1000-2000, 1500 is midpoint
read() // 0-180
attached() //Returns boolean
detach()

SoftwareSerial(RxPin,TxPin)
// #include<**SoftwareSerial**.h>
begin(longSpeed) // up to 9600
char **read**() // blocks till data
print(myData) or **println**(myData)

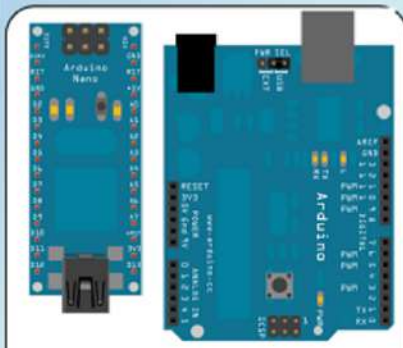
Wire (#include <Wire.h>) // For **I2C**
begin() // Join as master
begin(addr) // Join as slave @ addr
requestFrom(address, count)
beginTransmission(addr) // Step 1
send(mybyte) // Step 2
send(char * mystring)
send(byte * data, size)
endTransmission() // Step 3
byte **available**() // Num of bytes
byte **receive**() //Return next byte
onReceive(handler)
onRequest(handler)

	ATMega168	ATMega328	ATmega1280
Flash (2k for bootbloader)	16kB	32kB	128kB
SRAM	1kB	2kB	8kB
EEPROM	512B	1kB	4kB

	Duemilanove/ Nano/ Pro/ ProMini	Mega
# of IO	14 + 6 analog (Nano has 14+8)	54 + 16 analog
Serial Pins	0 - RX 1 - TX	0 - RX1 1 - TX1 19 - RX2 18 - TX2 17 - RX3 16 - TX3 15 - RX4 14 - TX4
Ext Interrupts	2 - (Int 0) 3 - (Int 1)	2,3,21,20,19,18 (IRQ0- IRQ5)
PWM pins	5,6 - Timer 0 9,10 - Timer 1 3,11 - Timer 2	0-13
SPI	10 - SS 11 - MOSI 12 - MISO 13 - SCK	53 - SS 51 - MOSI 50 - MISO 52 - SCK
I2C	Analog4 - SDA Analog5 - SCK	20 - SDA 21 - SCL



From Arduino.CC



Pics from Fritzing.Org under C.C. license

Arduino Programming Cheat Sheet

Primary source: Arduino Language Reference
http://arduino.cc/en/Reference/

Structure & Flow

Basic Program Structure
```
void setup() {
  // Runs once when sketch starts
}
void loop() {
  // Runs repeatedly
}
```

Control Structures
```
if (x < 5) { ... } else { ... }
while (x < 5) { ... }
for (int i = 0; i < 10; i++) { ... }
break;     // Exit a loop immediately
continue;  // Go to next iteration
switch (var) {
  case 1:
    ...
    break;
  case 2:
    ...
    break;
  default:
    ...
}
return x;  // x must match return type
return;    // For void return type
```

Function Definitions
```
<ret. type> <name>(<params>) { ... }
e.g. int double(int x) {return x*2;}
```

Operators

General Operators

=	assignment		
+	add	-	subtract
*	multiply	/	divide
%	modulo		
==	equal to	!=	not equal to
<	less than	>	greater than
<=	less than or equal to		
>=	greater than or equal to		
&&	and	||	or
!	not		

Compound Operators

++	increment
--	decrement
+=	compound addition
-=	compound subtraction
*=	compound multiplication
/=	compound division
&=	compound bitwise and
|=	compound bitwise or

Bitwise Operators

&	bitwise and	|	bitwise or
^	bitwise xor	~	bitwise not
<<	shift left	>>	shift right

Pointer Access

&	reference: get a pointer
*	dereference: follow a pointer

Built-in Functions

Pin Input/Output
```
Digital I/O - pins 0-13 A0-A5
  pinMode(pin,
    [INPUT, OUTPUT, INPUT_PULLUP])
  int digitalread(pin)
  digitalWrite(pin, [HIGH, LOW])

Analog In - pins A0-A5
  int analogRead(pin)
  analogReference(
    [DEFAULT, INTERNAL, EXTERNAL])

PWM Out - pins 3 5 6 9 10 11
  analogWrite(pin, value)
```

Advanced I/O
```
tone(pin, freq_Hz)
tone(pin, freq_Hz, duration_ms)
noTone(pin)
shiftOut(dataPin, clockPin,
  [MSBFIRST, LSBFIRST], value)
unsigned long pulseIn(pin,
  [HIGH, LOW])
```

Time
```
unsigned long millis()
  // Overflows at 50 days
unsigned long micros()
  // Overflows at 70 minutes
delay(msec)
delayMicroseconds(usec)
```

Math
```
min(x, y)   max(x, y)   abs(x)
sin(rad)    cos(rad)    tan(rad)
sqrt(x)     pow(base, exponent)
constrain(x, minval, maxval)
map(val, fromL, fromH, toL, toH)
```

Random Numbers
```
randomSeed(seed) // long or int
long random(max) // 0 to max-1
long random(min, max)
```

Bits and Bytes
```
lowByte(x)    highByte(x)
bitRead(x, bitn)
bitWrite(x, bitn, bit)
bitSet(x, bitn)
bitClear(x, bitn)
bit(bitn)  // bitn: 0=LSB 7=MSB
```

Type Conversions
```
char(val)     byte(val)
int(val)      word(val)
long(val)     float(val)
```

External Interrupts
```
attachInterrupt(interrupt, func,
 [LOW, CHANGE, RISING, FALLING])
detachInterrupt(interrupt)
interrupts()
noInterrupts()
```

Libraries

Serial - comm. with PC or via RX/TX
```
begin(long speed)  // Up to 115200
end()
int available()  // #bytes available
int read()   // -1 if none available
int peek()   // Read w/o removing
flush()
print(data)    println(data)
write(byte)    write(char * string)
write(byte * data, size)
SerialEvent()  // Called if data rdy
```

SoftwareSerial.h - comm. on any pin
```
SoftwareSerial(rxPin, txPin)
begin(long speed)  // Up to 115200
listen()       // Only 1 can listen
isListening()  // at a time.
read, peek, print, println, write
  // Equivalent to Serial library
```

EEPROM.h - access non-volatile memory
```
byte read(addr)
write(addr, byte)
EEPROM[index]  // Access as array
```

Servo.h - control servo motors
```
attach(pin, [min_uS, max_uS])
write(angle)  // 0 to 180
writeMicroseconds(uS)
   // 1000-2000; 1500 is midpoint
int read()    // 0 to 180
bool attached()
detach()
```

Wire.h - I²C communication
```
begin()     // Join a master
begin(addr) // Join a slave @ addr
requestFrom(address, count)
beginTransmission(addr) // Step 1
send(byte)              // Step 2
send(char * string)
send(byte * data, size)
endTransmission()       // Step 3
int available() // #bytes available
byte receive()  // Get next byte
onReceive(handler)
onRequest(handler)
```

Variables, Arrays, and Data

Data Types

boolean	true | false
char	-128 - 127, 'a' '$' etc.
unsigned char	0 - 255
byte	0 - 255
int	-32768 - 32767
unsigned int	0 - 65535
word	0 - 65535
long	-2147483648 - 2147483647
unsigned long	0 - 4294967295
float	-3.4028e+38 - 3.4028e+38
double	currently same as float
void	i.e., no return value

Strings
```
char str1[8] =
  {'A','r','d','u','i','n','o','\0'};
  // Includes \0 null termination
char str2[8] =
  {'A','r','d','u','i','n','o'};
  // Compiler adds null termination
char str3[] = "Arduino";
char str4[8] = "Arduino";
```

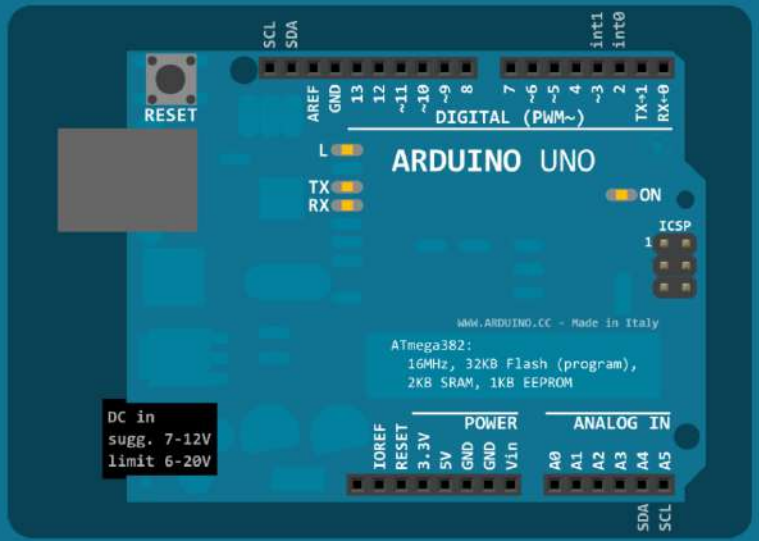
Numeric Constants

123	decimal
0b01111011	binary
0173	octal - base 8
0x7B	hexadecimal - base 16
123U	force unsigned
123L	force long
123UL	force unsigned long
123.0	force floating point
1.23e6	1.23*10^6 = 1230000

Qualifiers

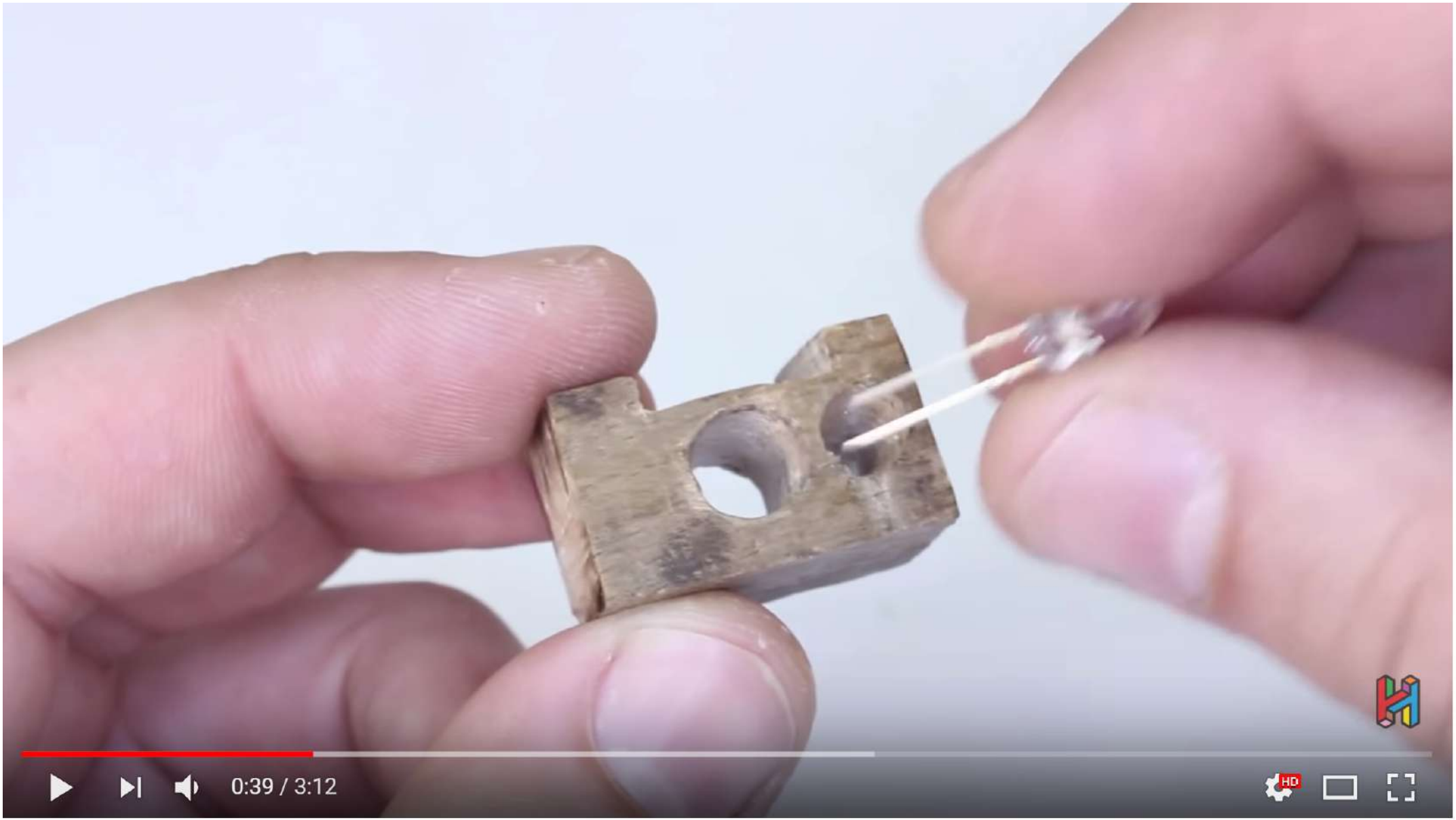
static	persists between calls
volatile	in RAM (nice for ISR)
const	read-only
PROGMEM	in flash

Arrays
```
int myPins[] = {2, 4, 8, 3, 6};
int myInts[6];   // Array of 6 ints
myInts[0] = 42;  // Assigning first
                 // index of myInts
myInts[6] = 12;  // ERROR! Indexes
                 // are 0 though 5
```

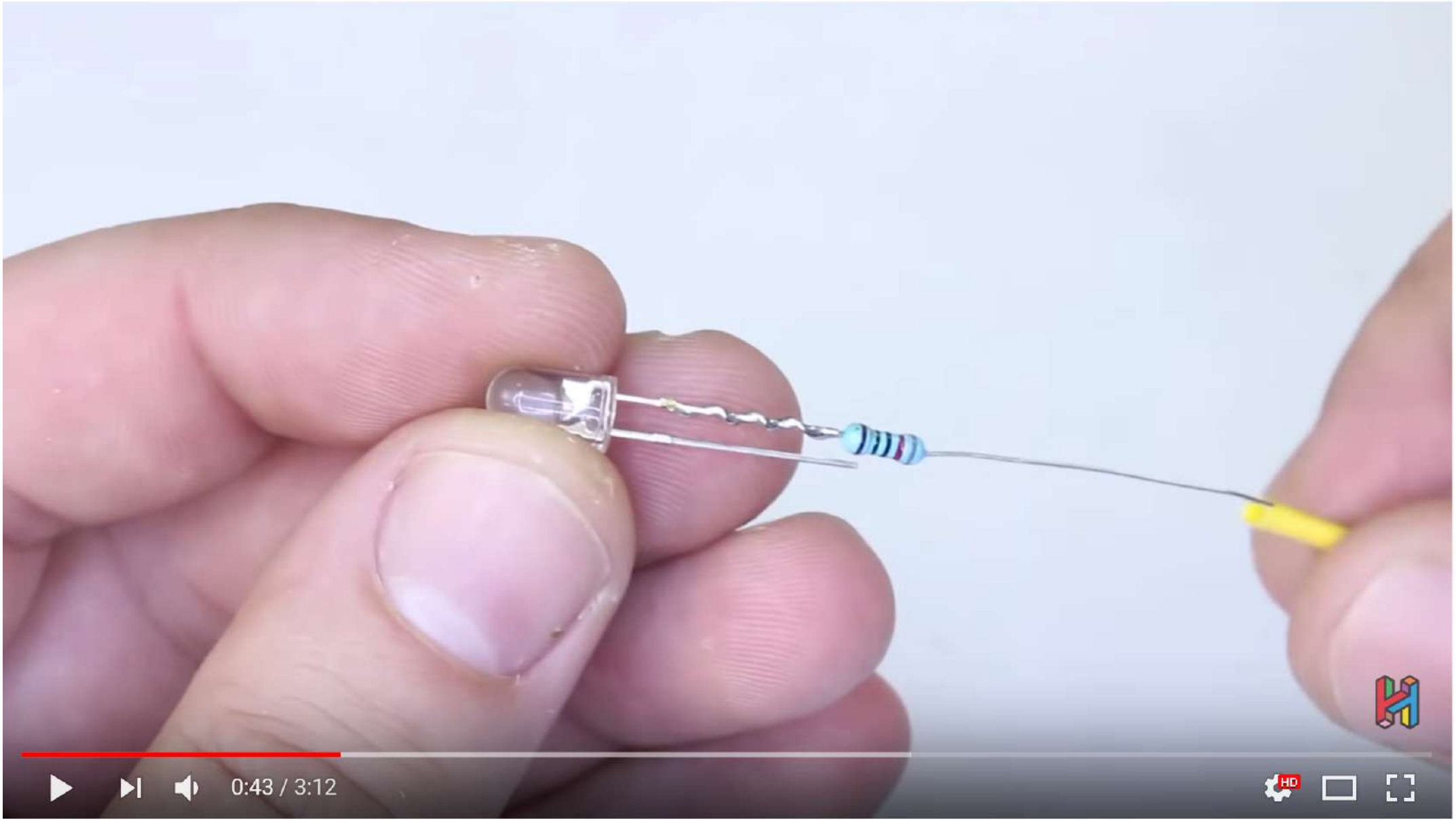


by Mark Liffiton

Adapted from:
- Original: Gavin Smith
- SVG version: Frederic Dufourg
- Arduino board drawing: Fritzing.org



DIY Mini Soldering Iron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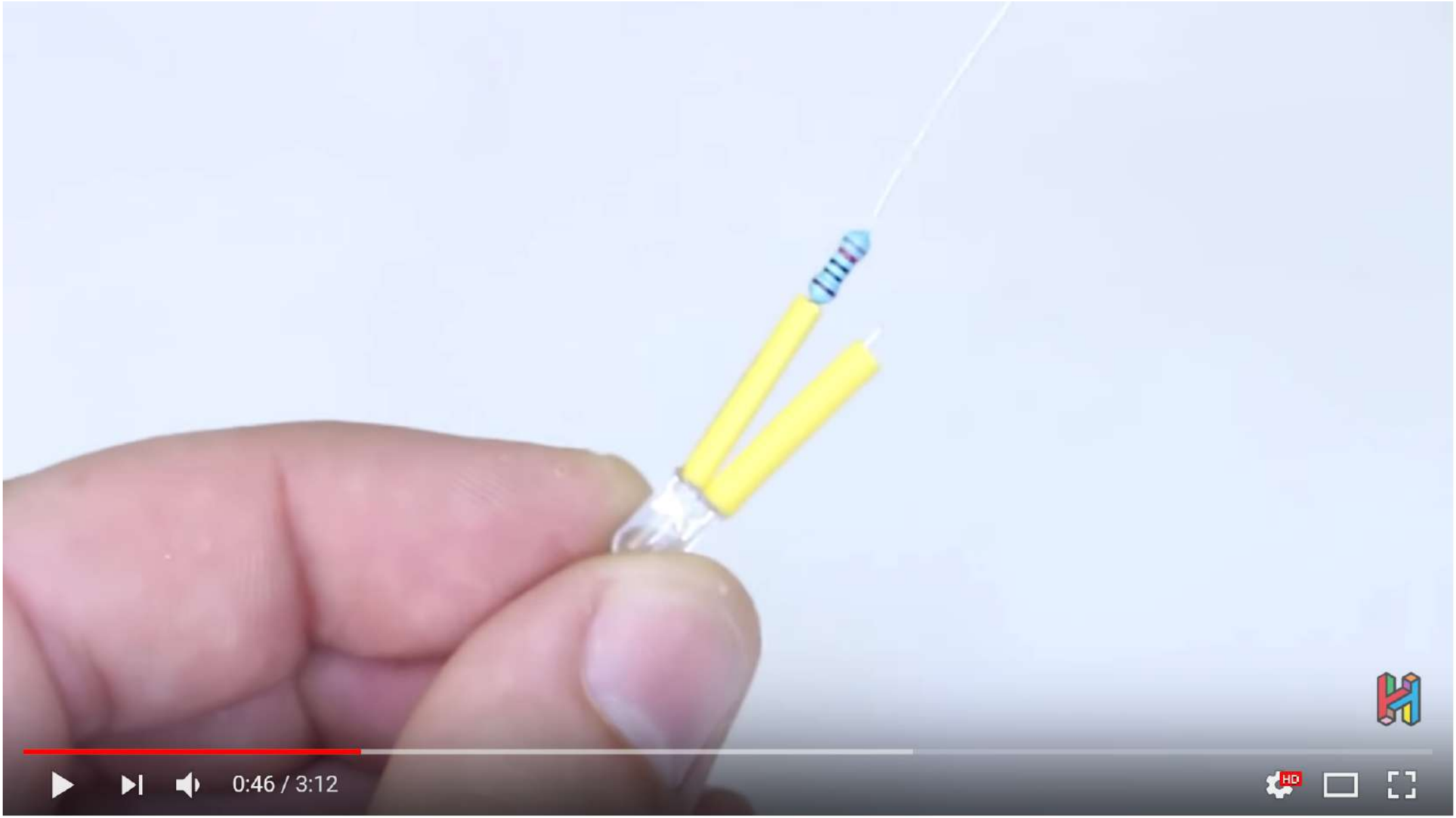
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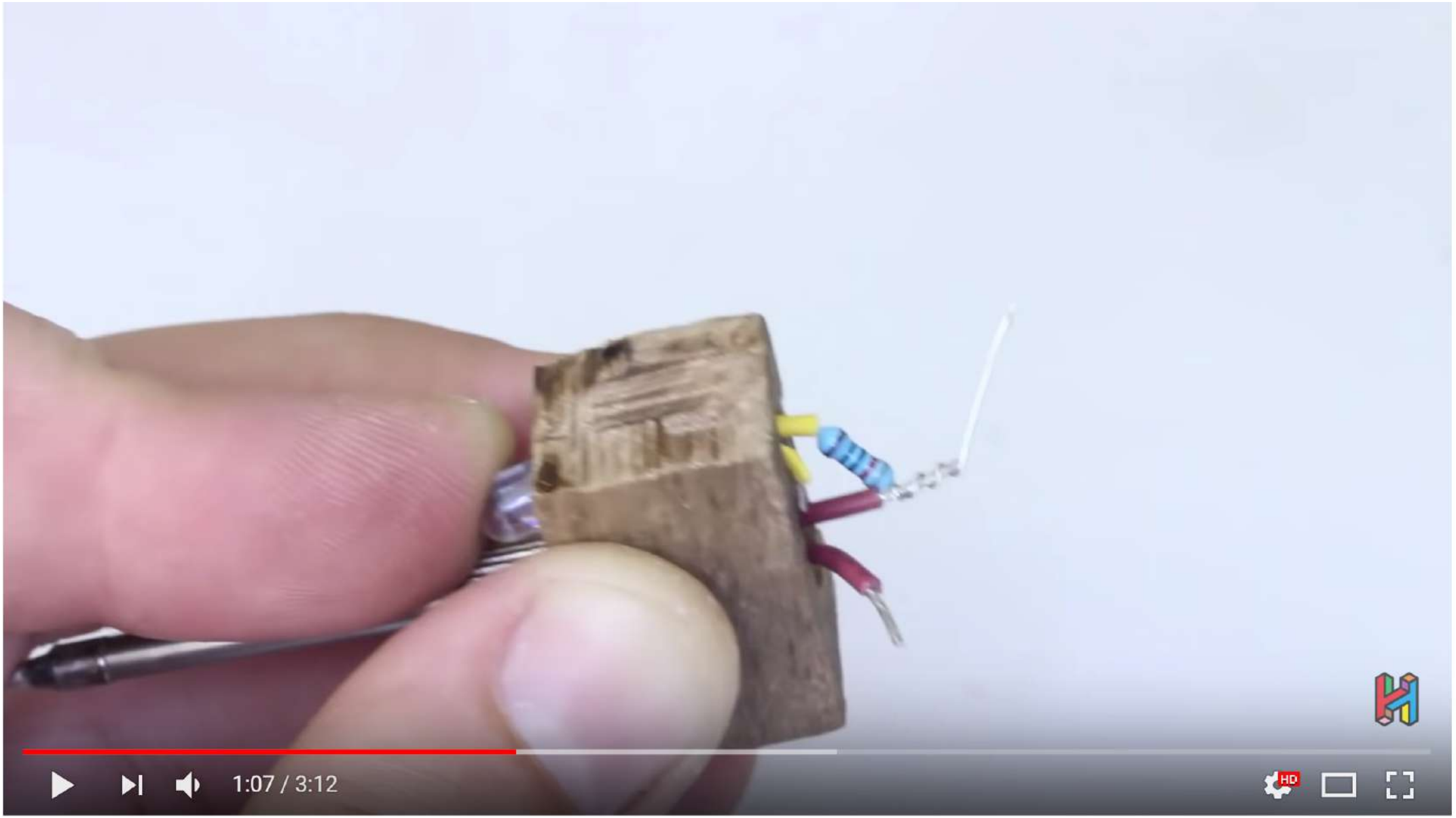
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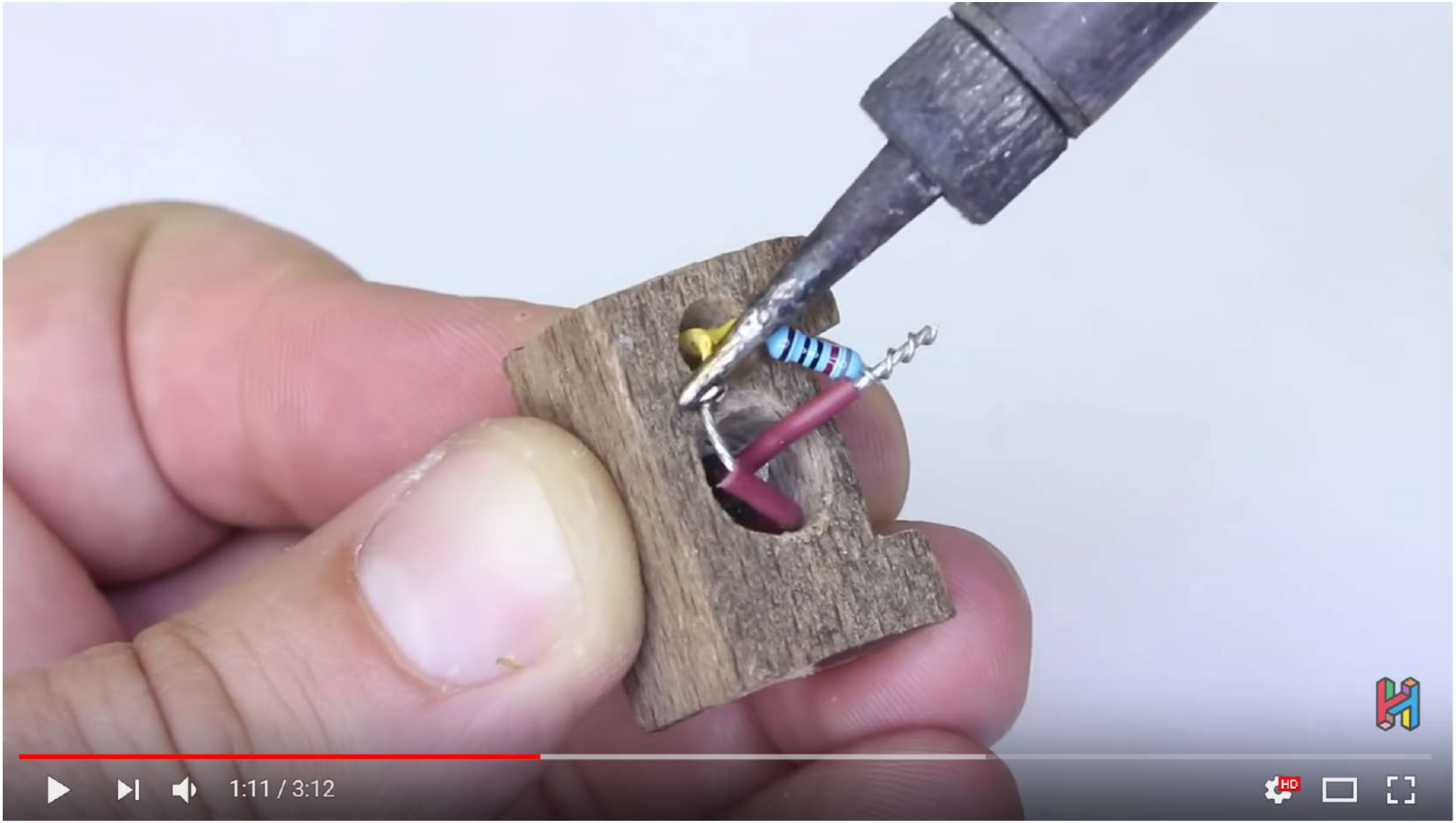
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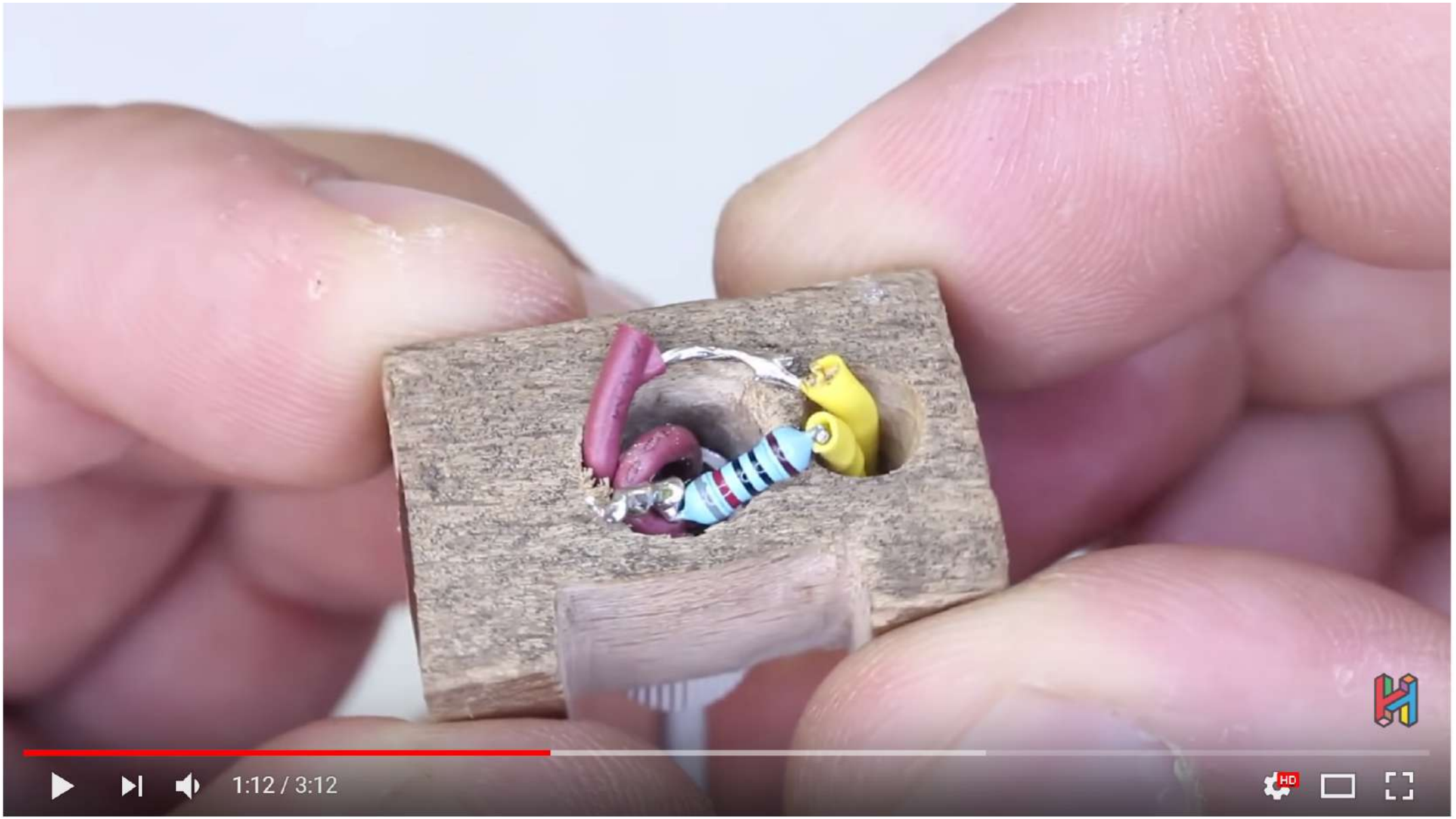
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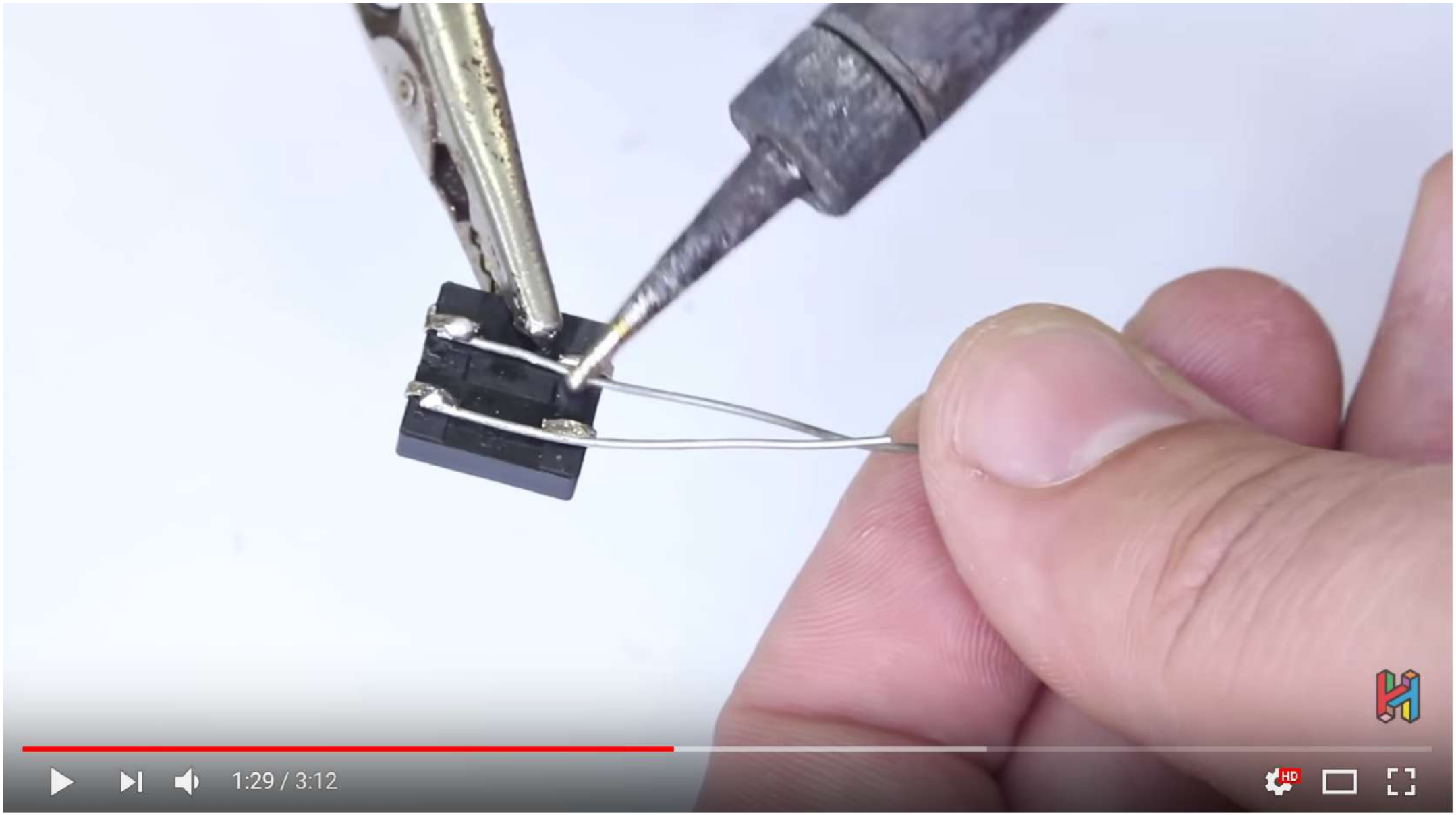
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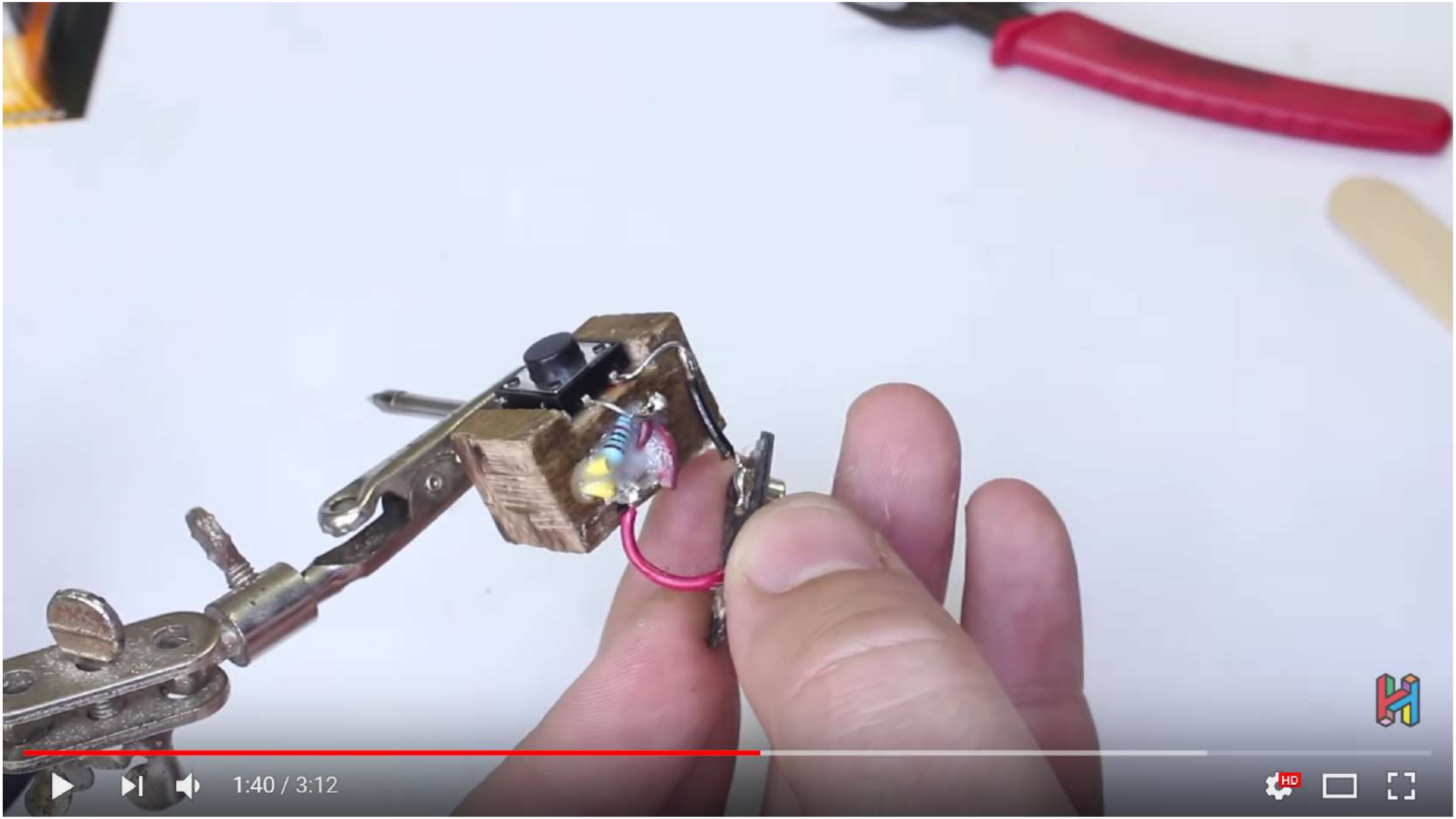
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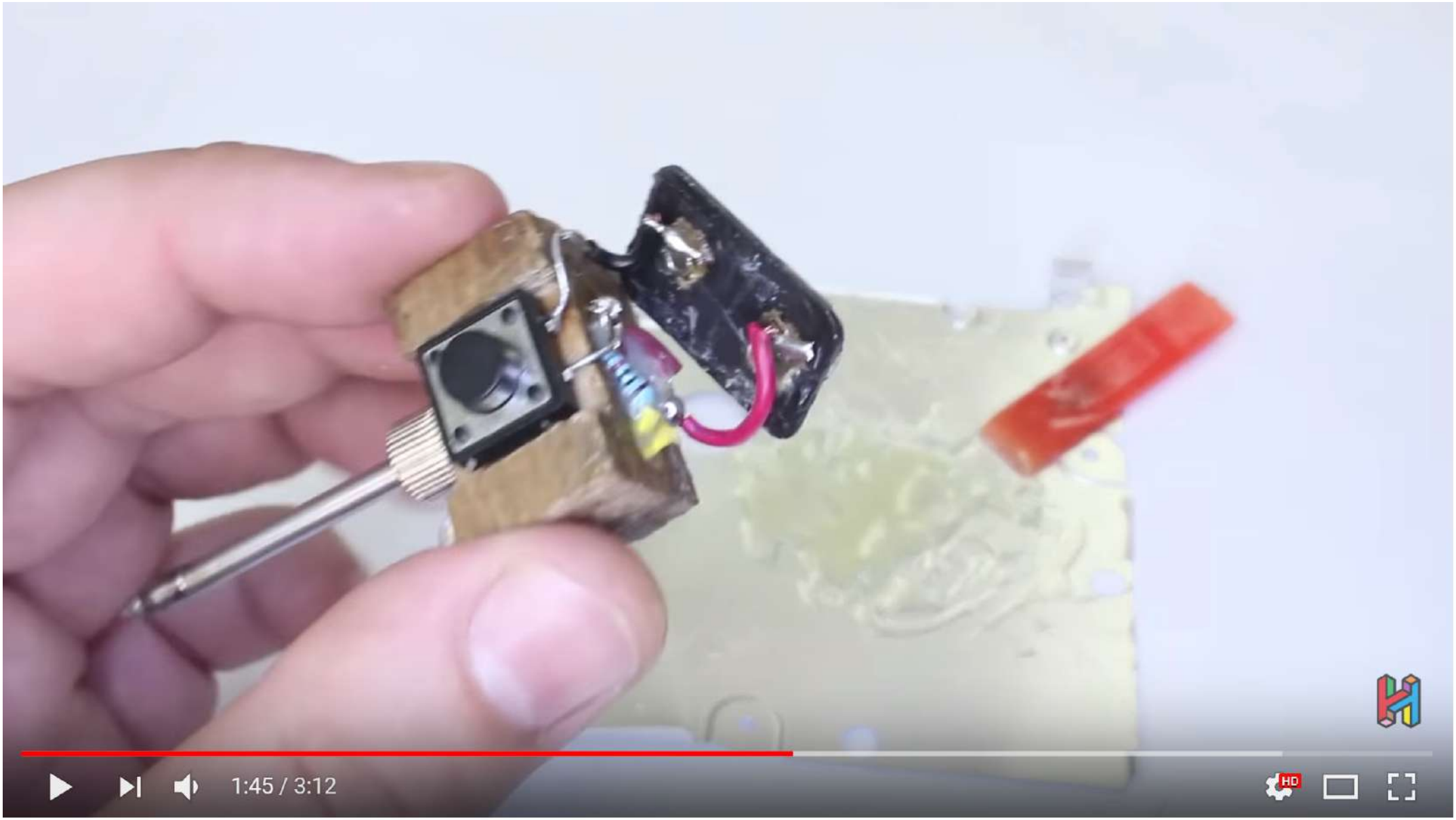
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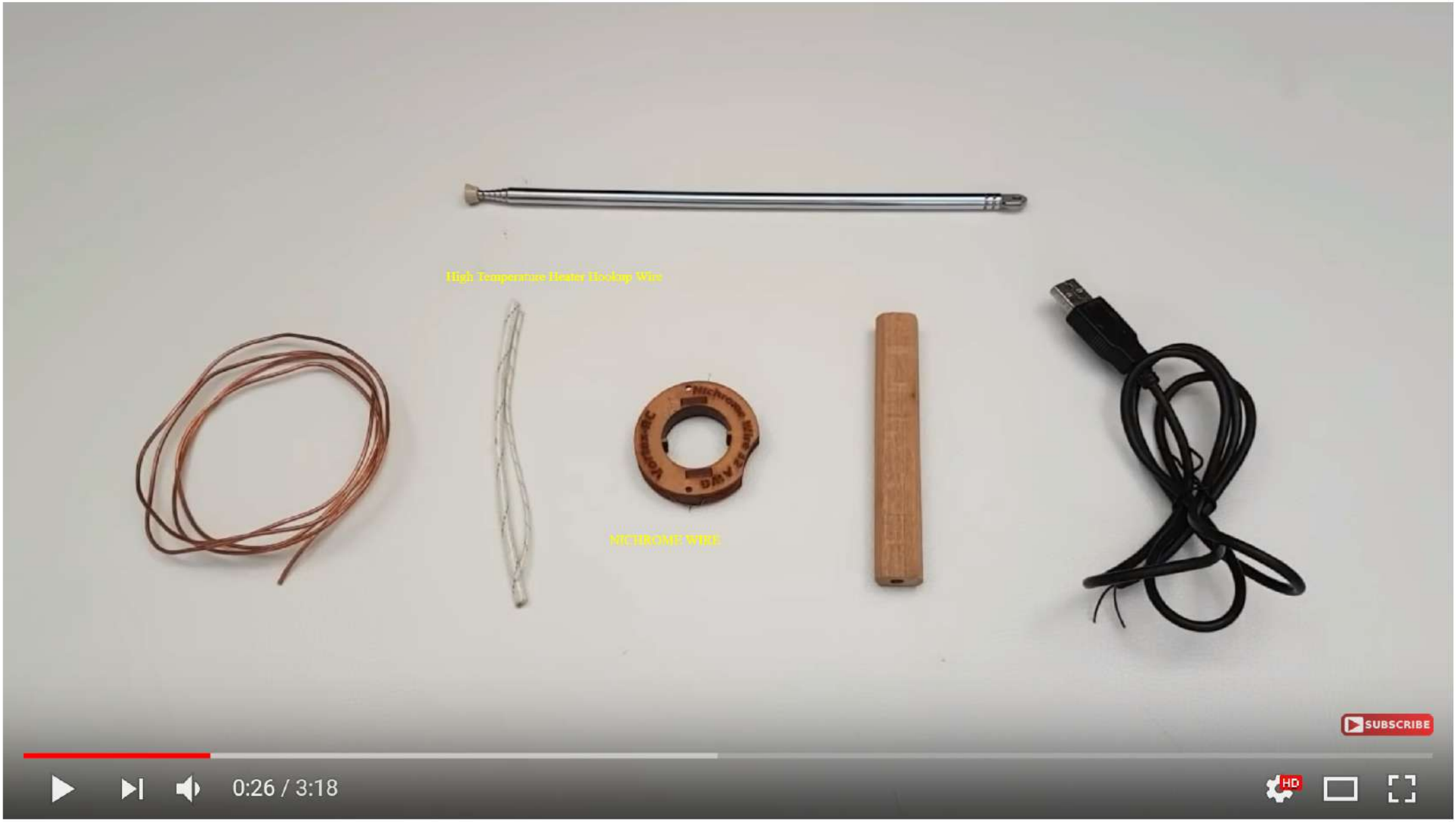
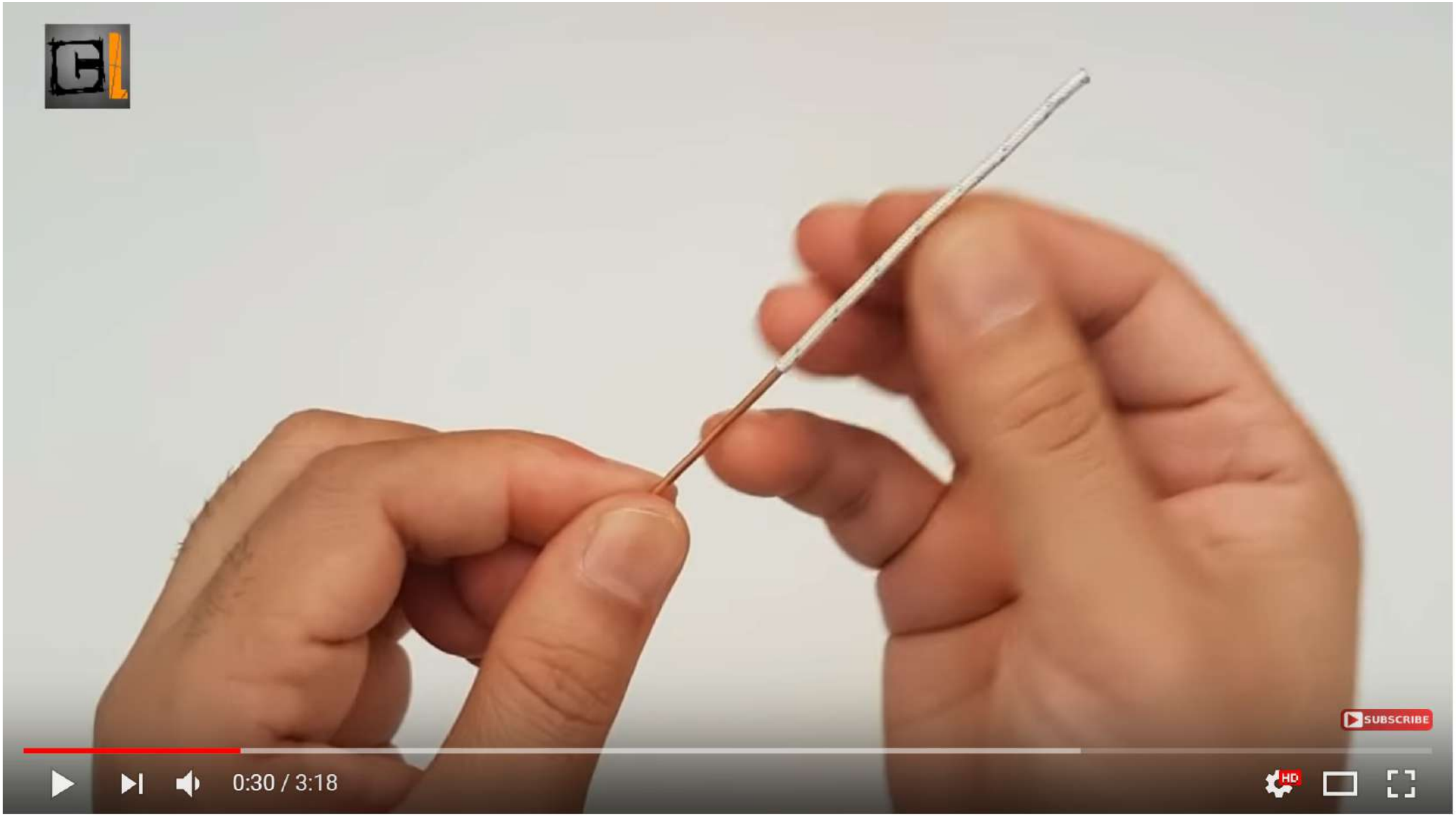


#howtomake #diy #craft

Mini Portable USB Soldering Iron 5 Volt - Homemade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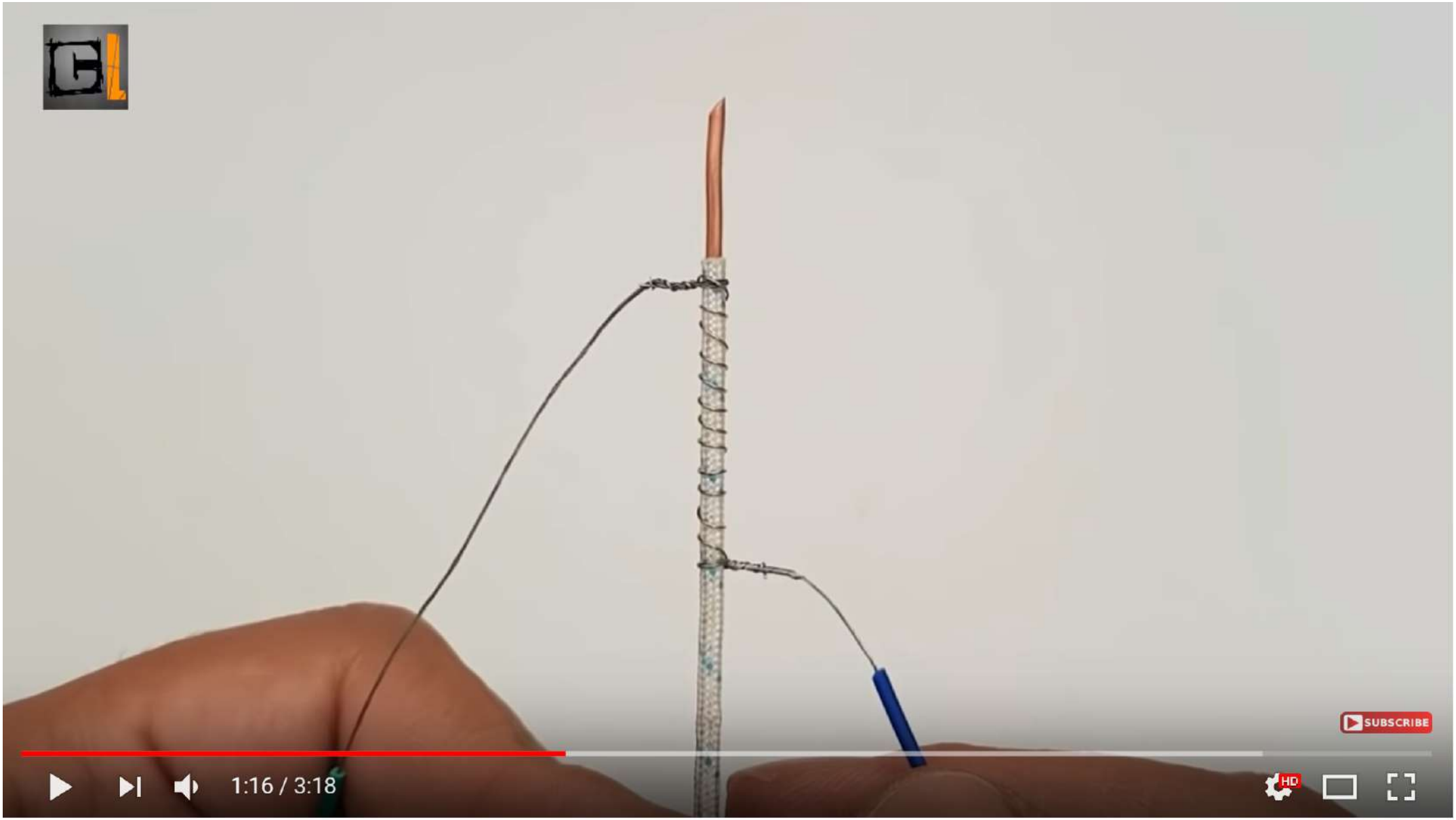
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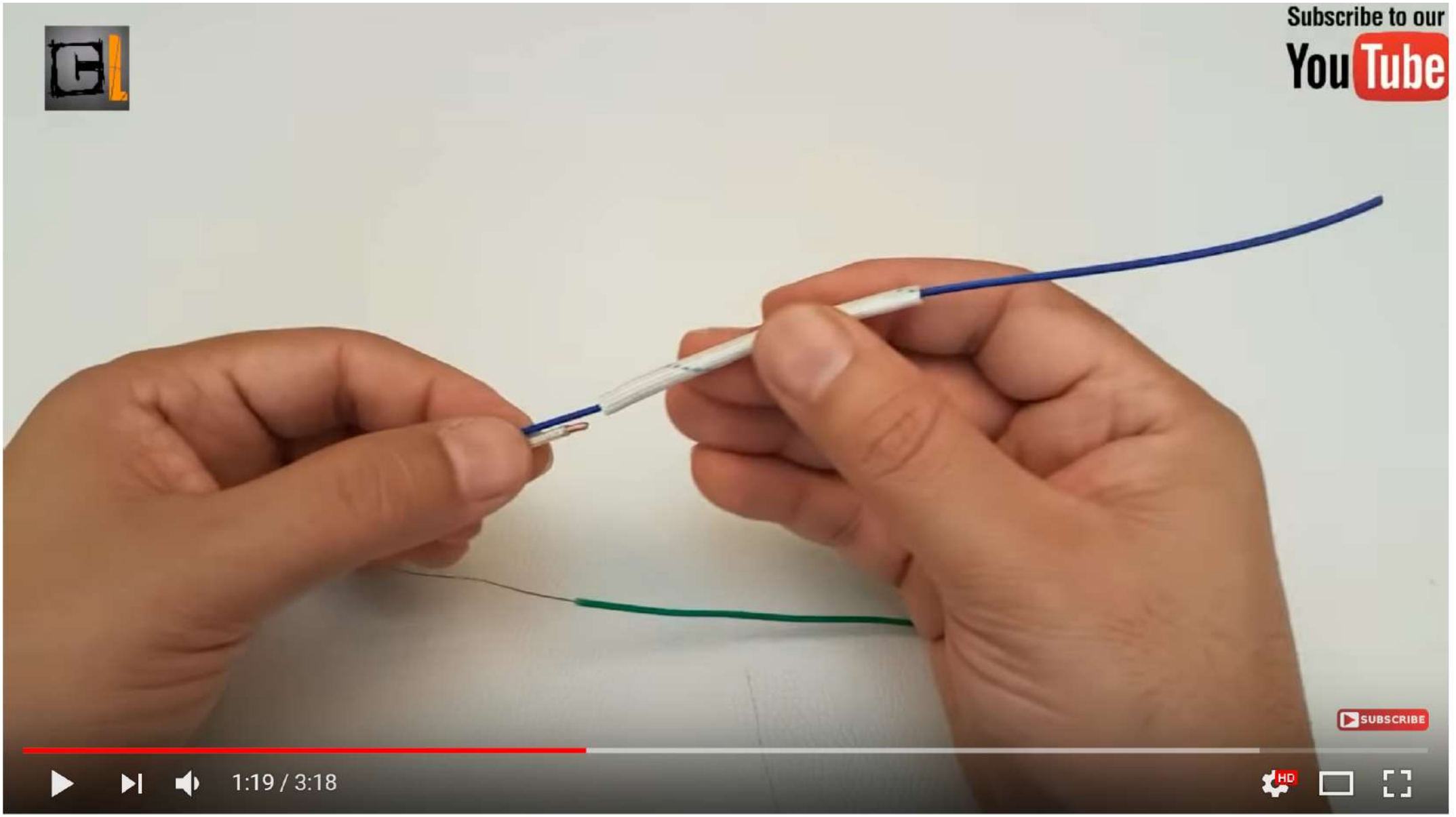
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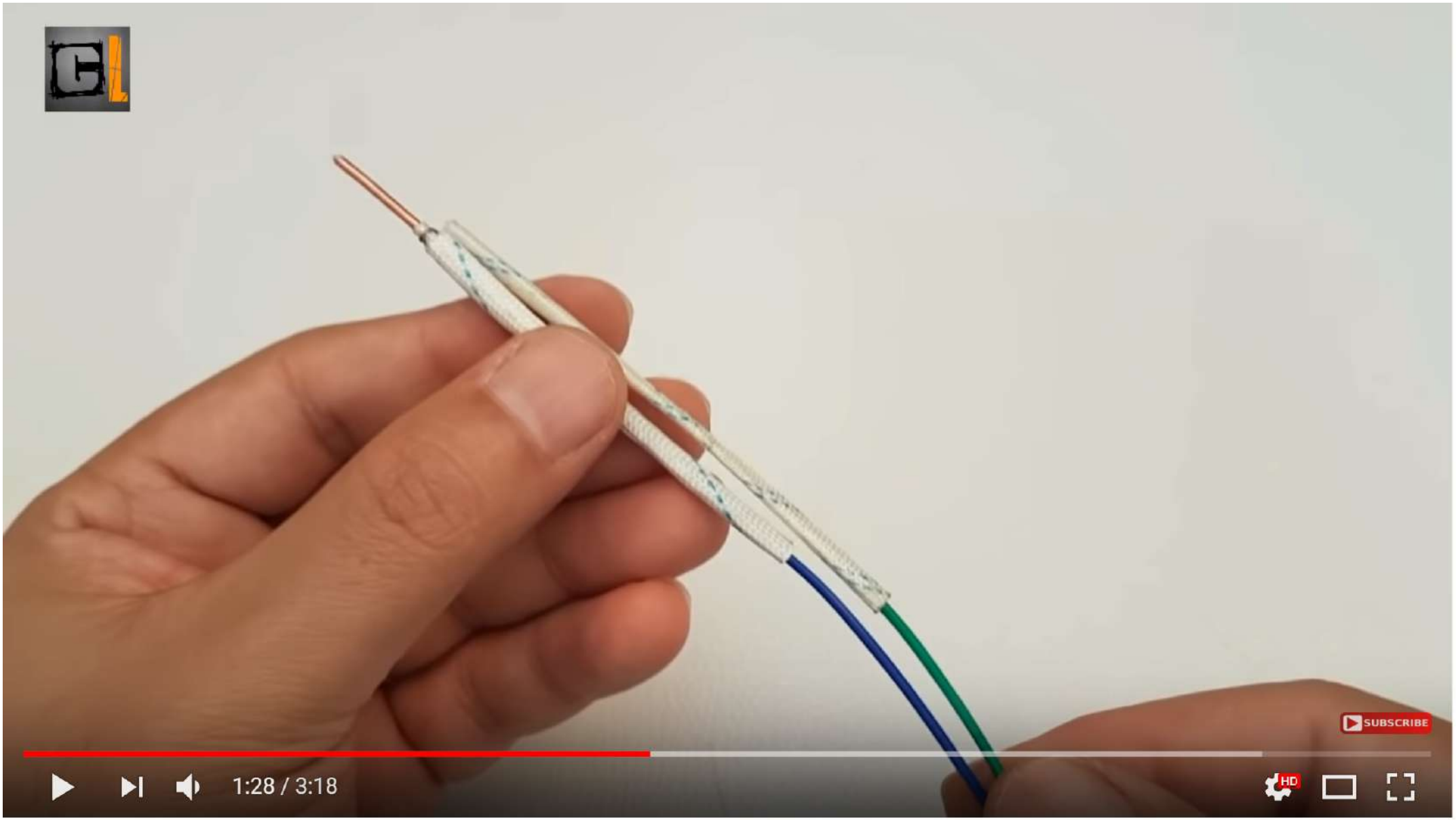
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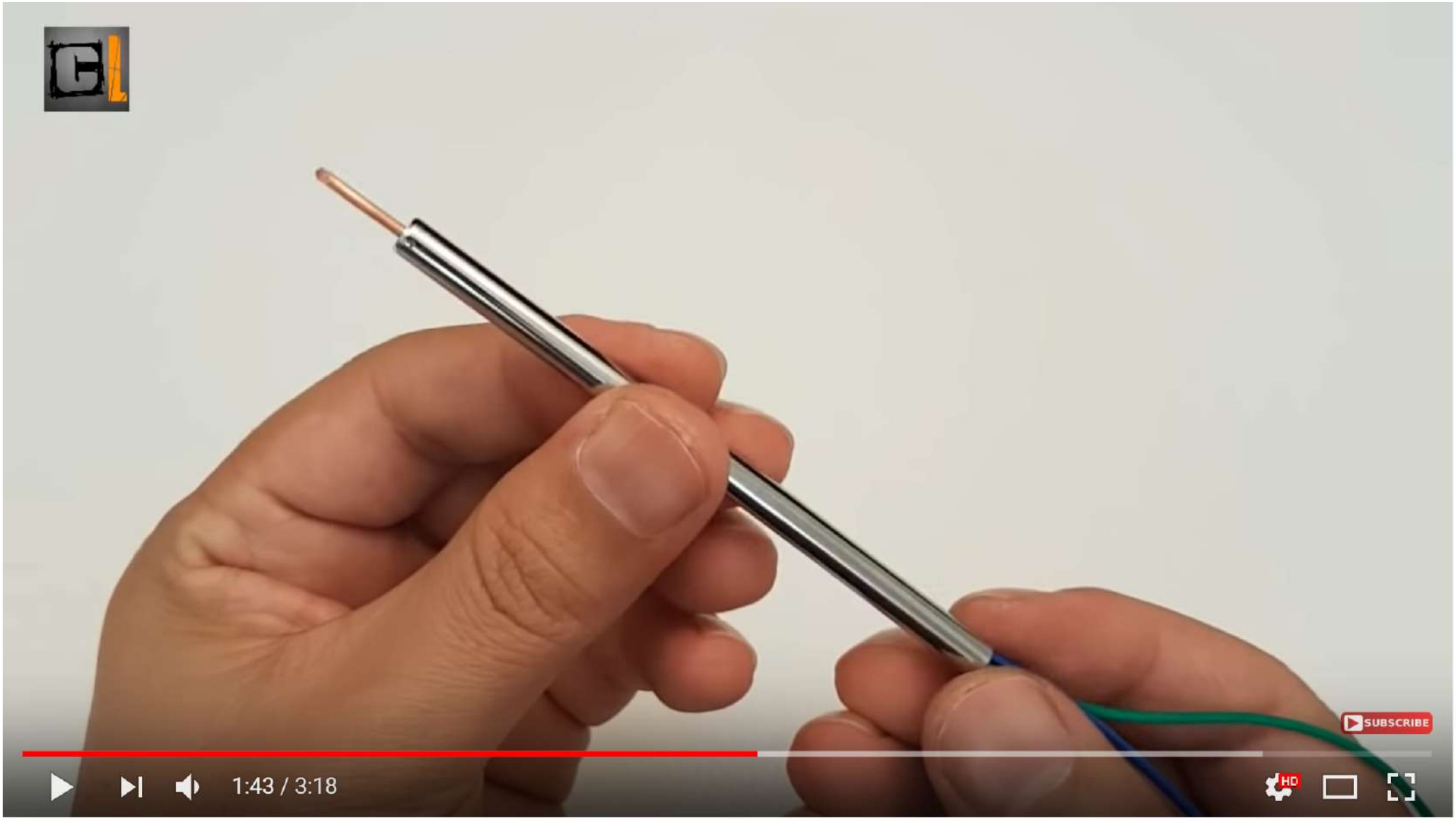
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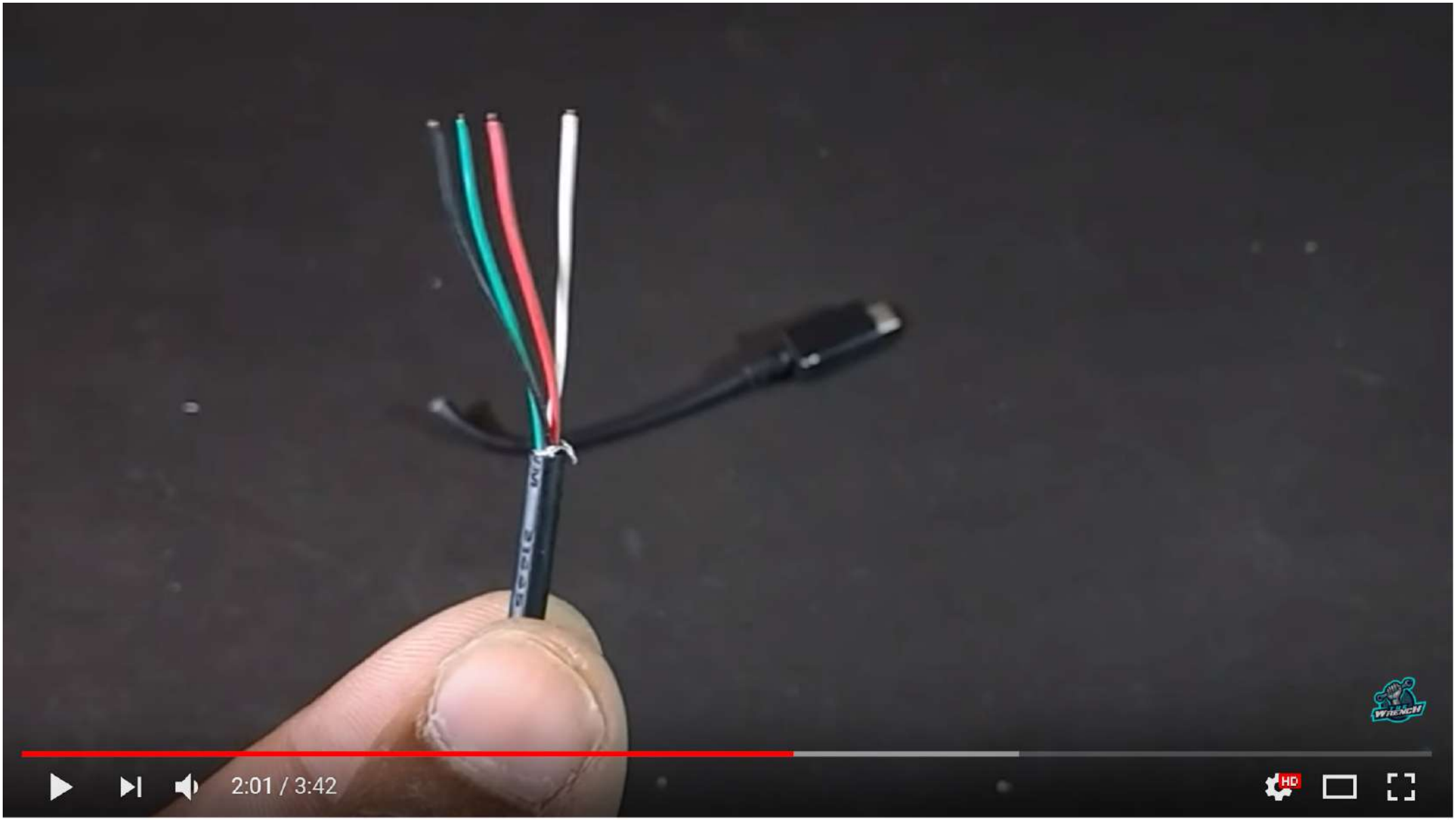
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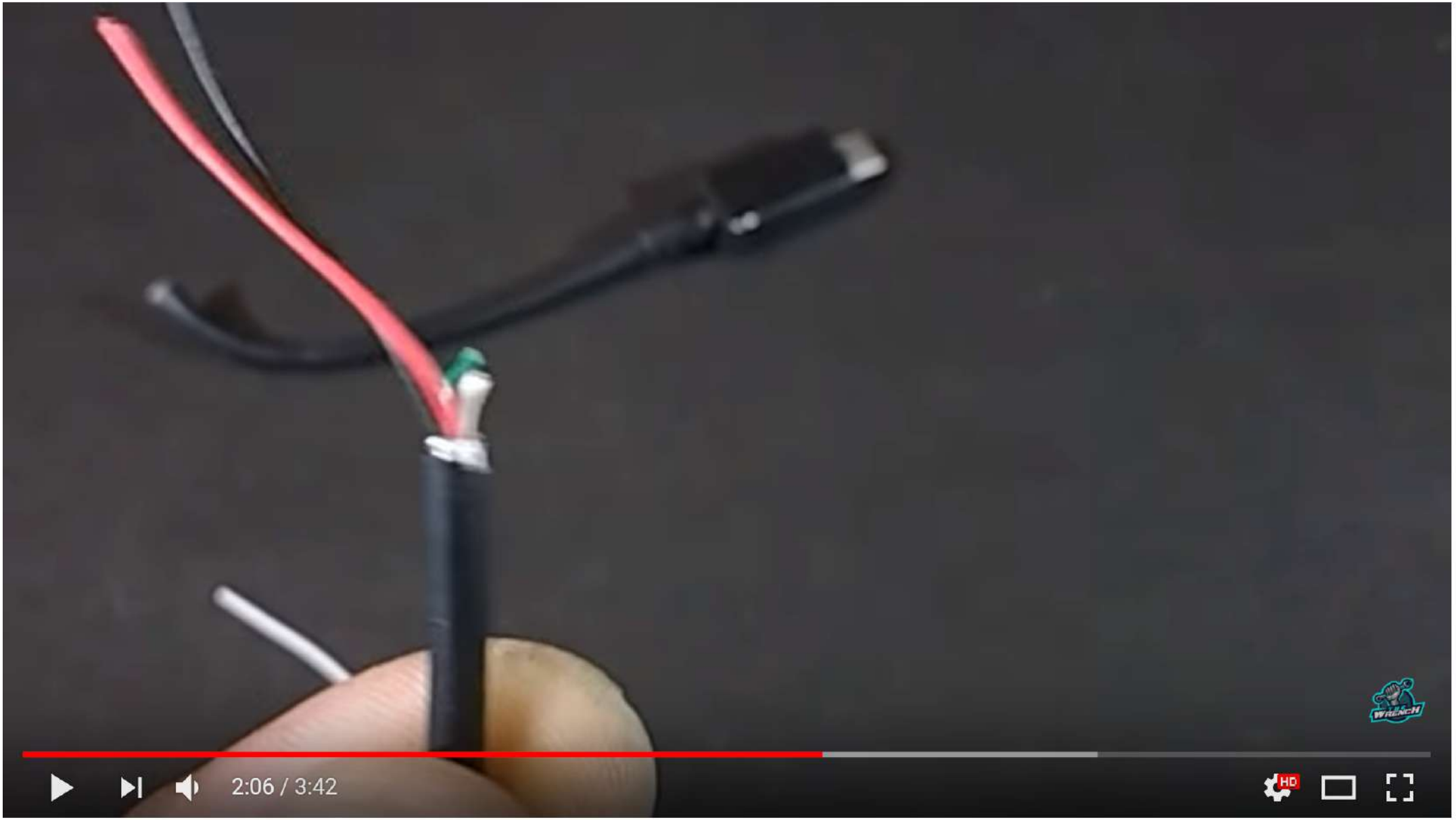
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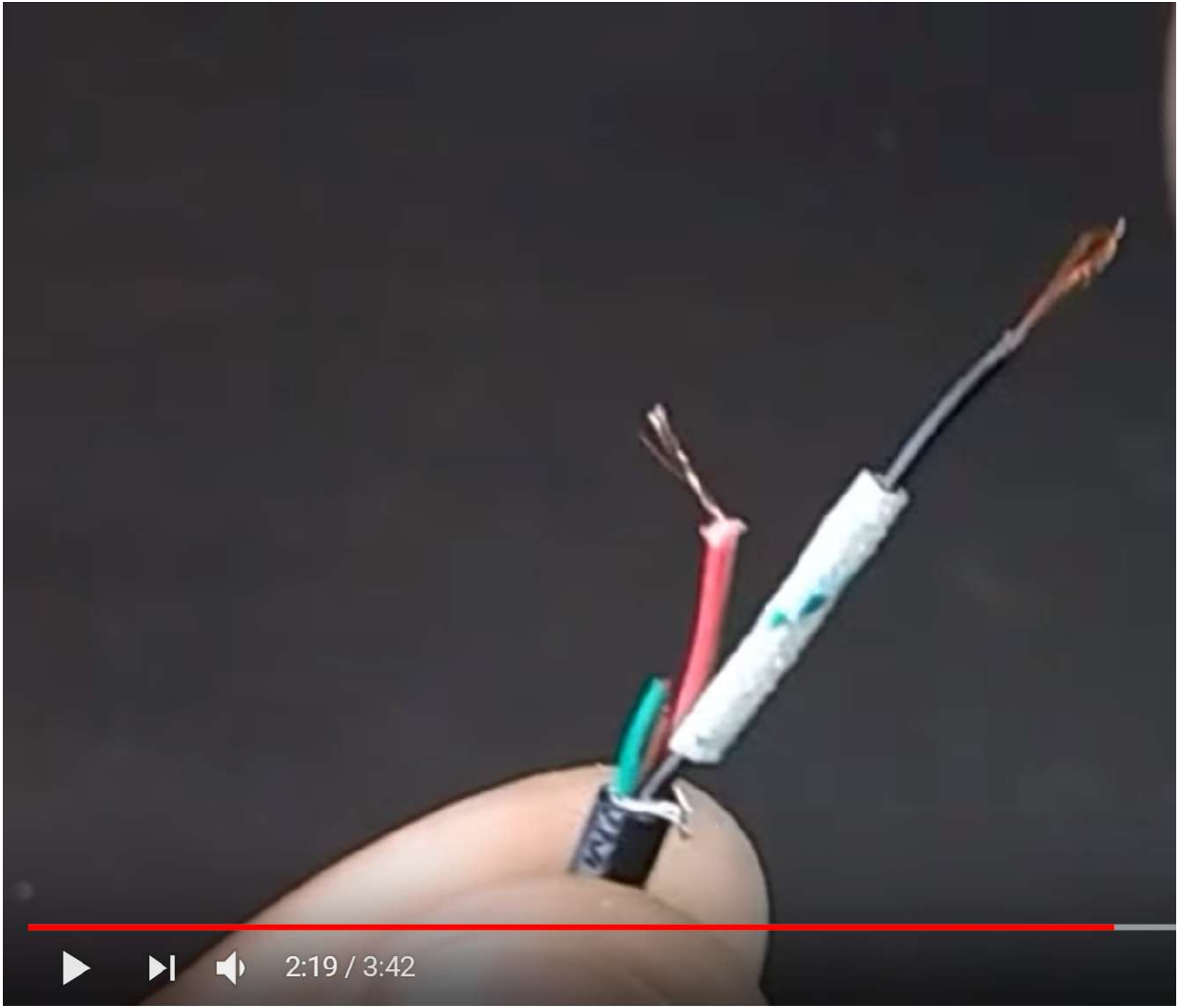
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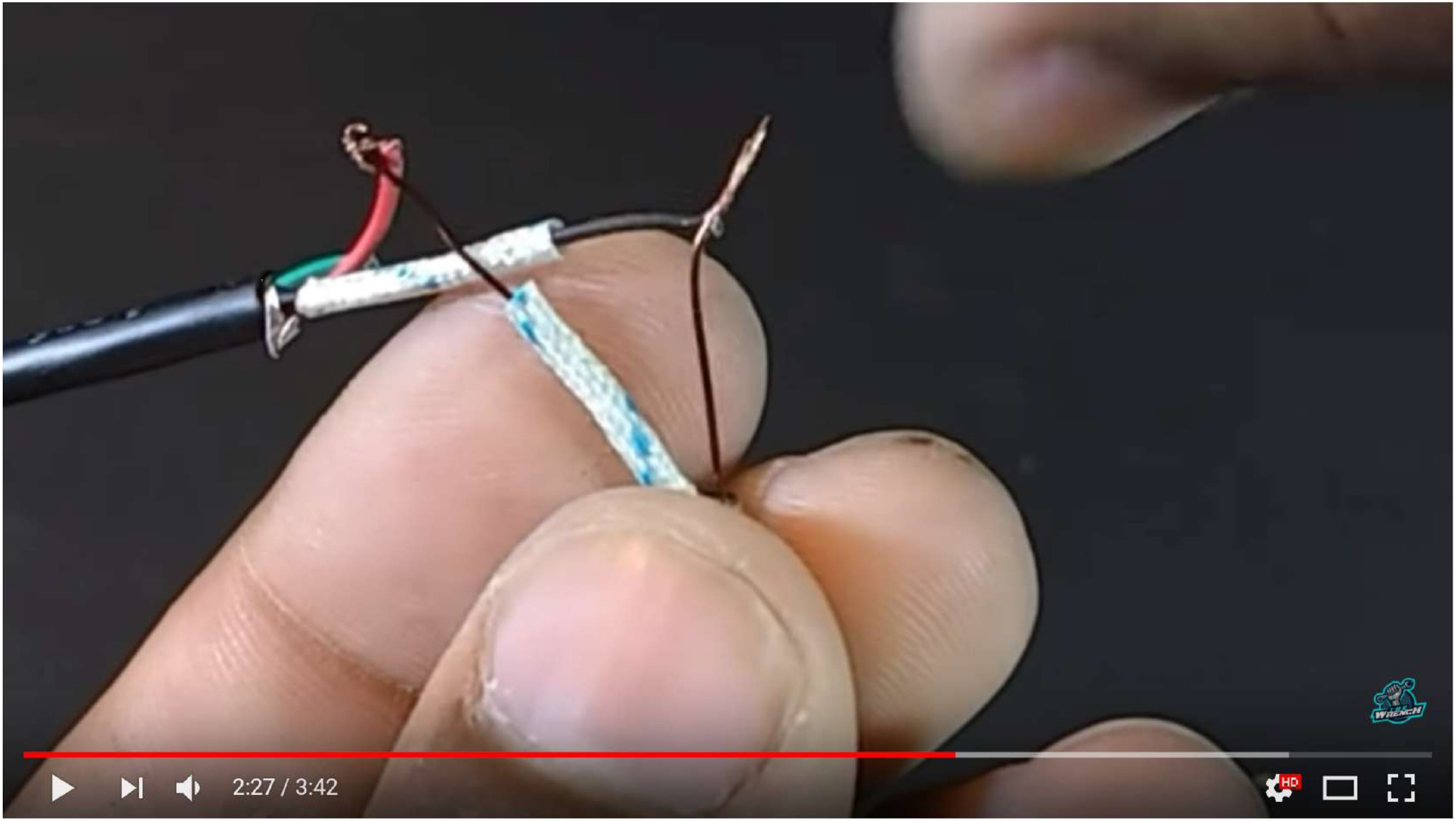
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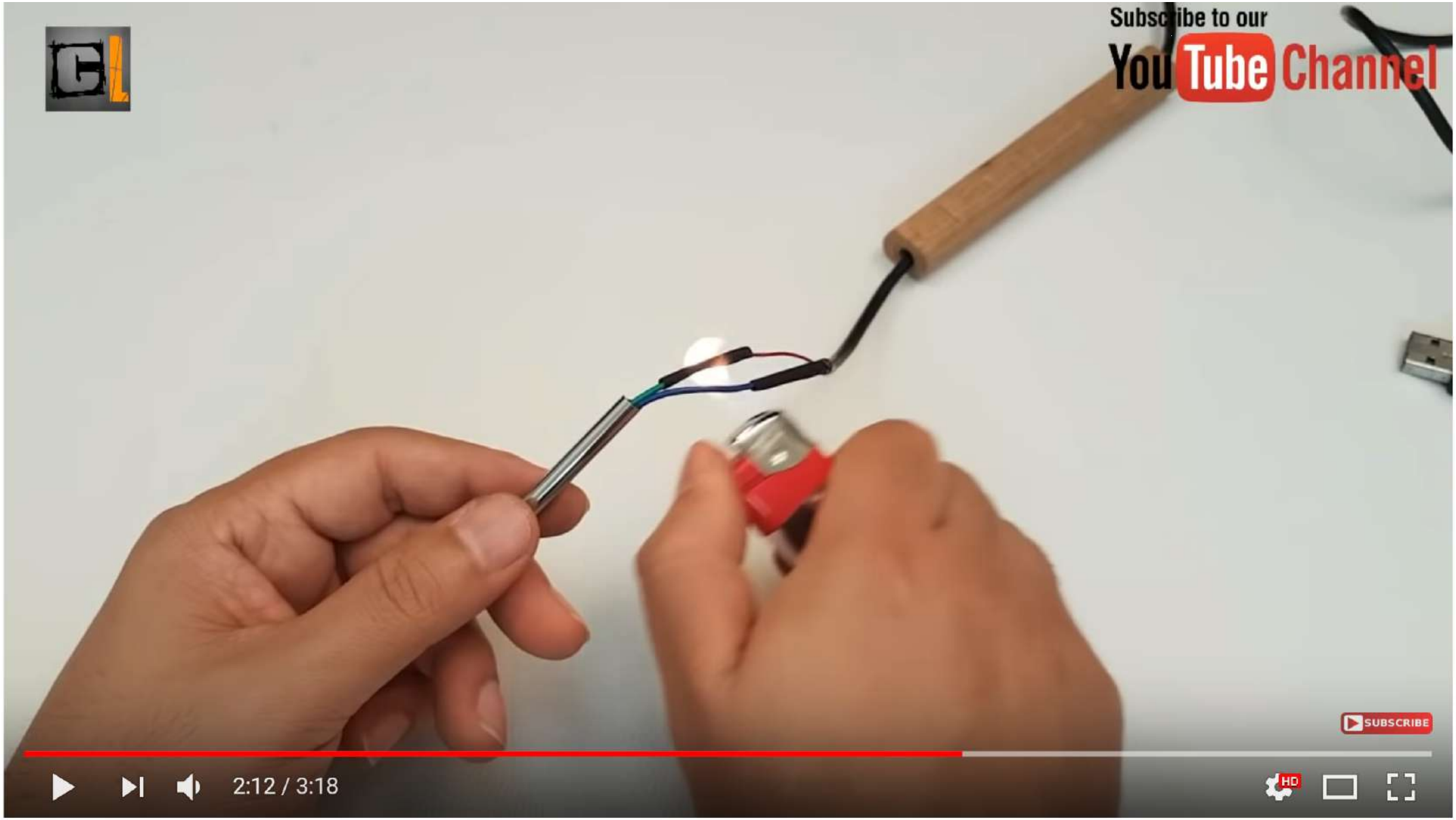
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551-1302
AC ADAPTOR
MODEL : C-P49
INPUT : 100-240V ~ 50/60Hz 0.3A
OUTPUT : 5.2V ⎓ 2.0A
MADE IN CHINA AcBel
Self declaration - Conforming to
IS13252(Part 1) : 2010, R-41013005
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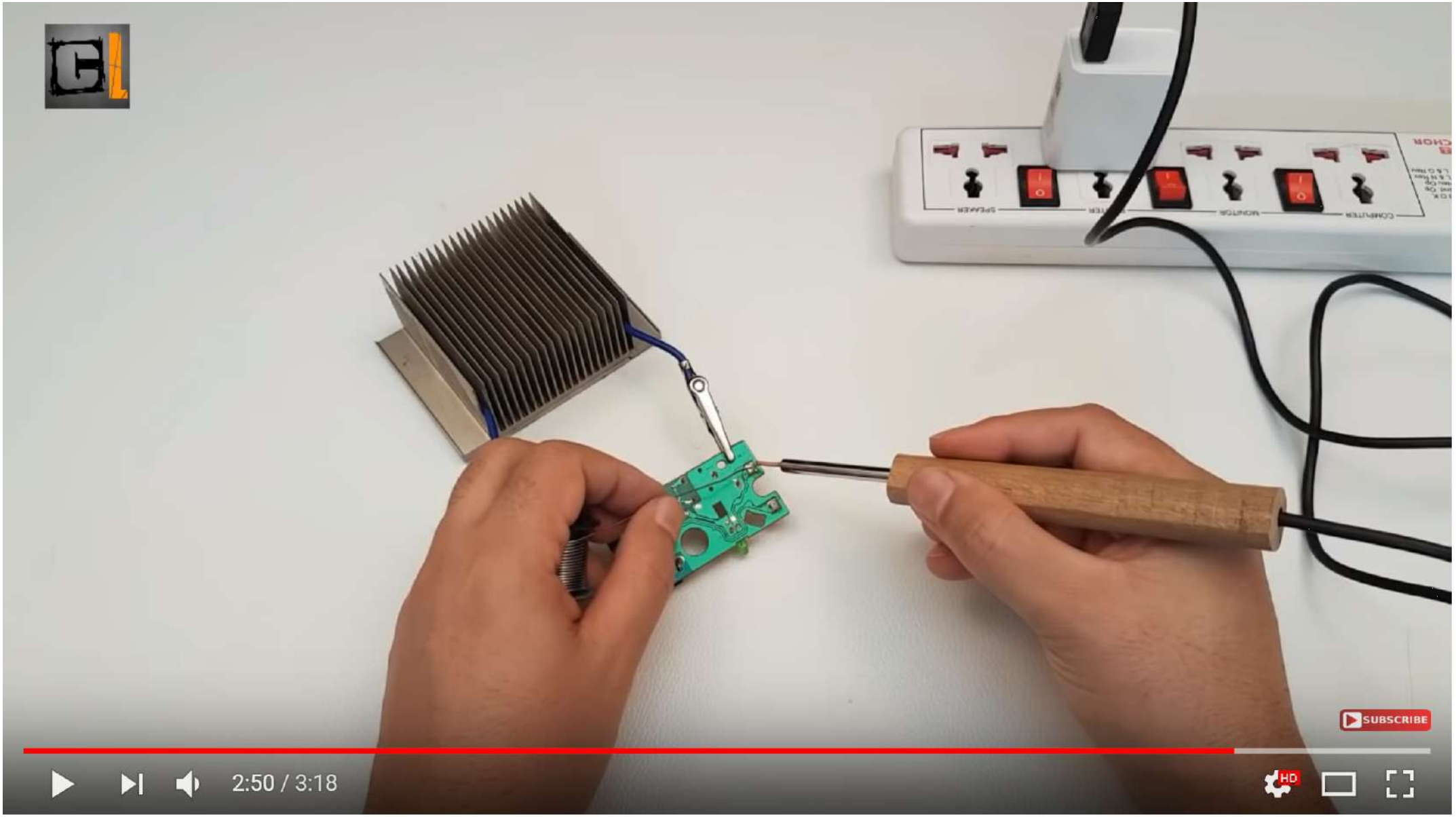
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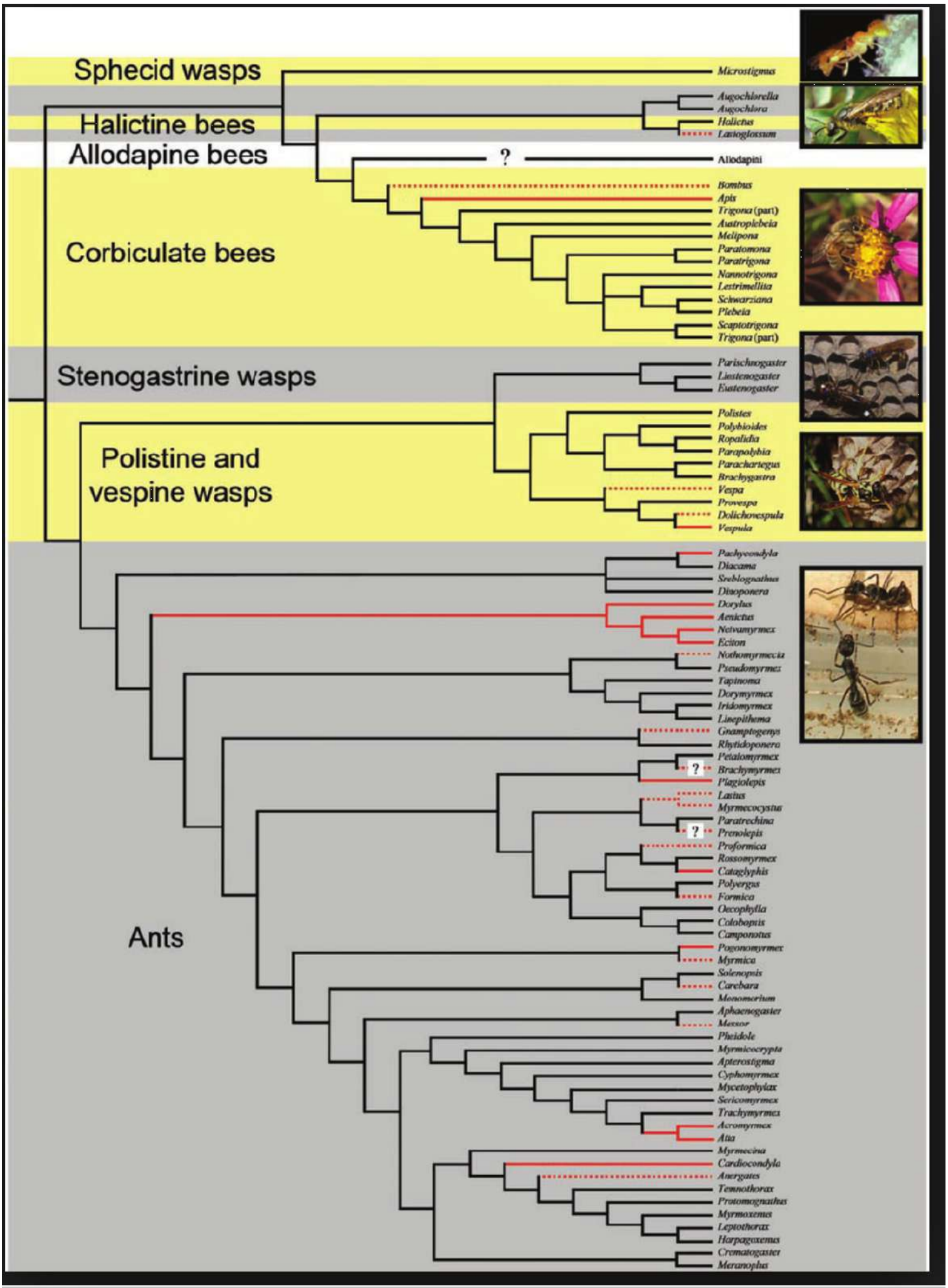
Sphecid wasps
Halictine bees
Allodapine bees
Corbiculate bees
Stenogastrine wasps
Polistine and vespine wasps
Ants
Microstigma
Augochlorella
Augochlora
Halictus
Lasioglossum
?
Allodapini
Bombus
Apis
Trigona (part)
Austroplebeia
Melipona
Paratomona
Paratrigona
Nannotrigona
Lestrimelitta
Schwarziana
Plebeia
Scaptotrigona
Trigona (part)
Parischnogaster
Liostenogaster
Eustenogaster
Polistes
Polybioides
Ropalidia
Parapolybia
Parachartegus
Brachygastra
Vespa
Provespa
Dolichovespula
Vespula
Pachycondyla
Diacama
Streblognathus
Dinoponera
Dorylus
Aenictus
Neivamyrmex
Eciton
Nothomyrmecia
Pseudomyrmex
Tapinoma
Dorymyrmex
Iridomyrmex
Linepithema
Gnamptogenys
Rhytidoponera
Petalomyrmex
?
Brachymyrmex
Plagiolepis
Lasius
Myrmecocystus
Paratrechina
?
Prenolepis
Proformica
Rossomyrmex
Cataglyphis
Polyergus
Formica
Oecophylla
Colobopsis
Camponotus
Pogonomyrmex
Myrmica
Solenopsis
Carebara
Monomorium
Aphaenogaster
Messor
Pheidole
Myrmicocrypta
Apterostigma
Cyphomyrmex
Mycetophylax
Sericomyrmex
Trachymyrmex
Acromyrmex
Atta
Myrmecina
Cardiocondyla
Anergates
Temnothorax
Protomognathus
Myrmoxenus
Leptothorax
Harpagoxenus
Crematogaster
Meranoplus

JAPANESE GIANT HORNET & AFRICAN KILLER BEES

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10 Bullet Ant

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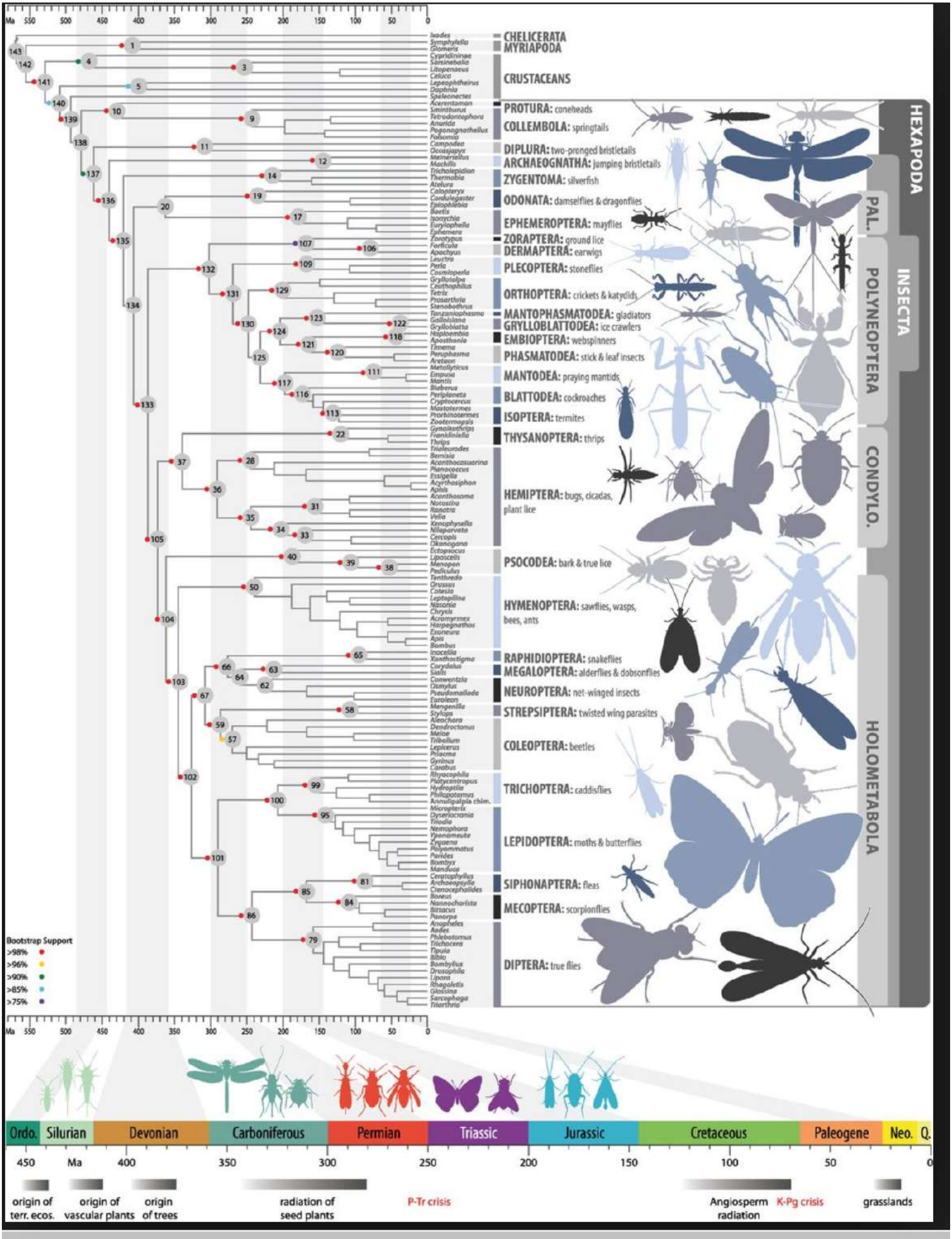

CHELICERATA
MYRIAPODA
CRUSTACEANS
HEXAPODA
INSECTA
PAL.
POLYNEOPTERA
CONDYLO.
HOLOMETABOLA
PROTURA: coneheads
COLLEMBOLA: springtails
DIPLURA: two-pronged bristletails
ARCHAEOGNATHA: jumping bristletails
ZYGENTOMA: silverfish
ODONATA: damselflies & dragonflies
EPHEMEROPTERA: mayflies
ZORAPTERA: ground lice
DERMAPTERA: earwigs
PLECOPTERA: stoneflies
ORTHOPTERA: crickets & katydids
MANTOPHASMATODEA: gladiators
GRYLLOBLATTODEA: ice crawlers
EMBIOPTERA: webspinners
PHASMATODEA: stick & leaf insects
MANTODEA: praying mantids
BLATTODEA: cockroaches
ISOPTERA: termites
THYSANOPTERA: thrips
HEMIPTERA: bugs, cicadas, plant lice
PSOCODEA: bark & true lice
HYMENOPTERA: sawflies, wasps, bees, ants
RAPHIDIOPTERA: snakeflies
MEGALOPTERA: alderflies & dobsonflies
NEUROPTERA: net-winged insects
STREPSIPTERA: twisted wing parasites
COLEOPTERA: beetles
TRICHOPTERA: caddisflies
LEPIDOPTERA: moths & butterflies
SIPHONAPTERA: fleas
MECOPTERA: scorpionflies
DIPTERA: true flies
Bootstrap Support
>98%
>96%
>90%
>85%
>75%
Ma
Ordo.
Silurian
Devonian
Carboniferous
Permian
Triassic
Jurassic
Cretaceous
Paleogene
Neo.
Q.
origin of terr. ecos.
origin of vascular plants
origin of trees
radiation of seed plants
P-Tr crisis
Angiosperm radiation
K-Pg crisis
grasslands

4 | Black Widow Spiders

35 | Velvet Ants


BANANA SPIDER

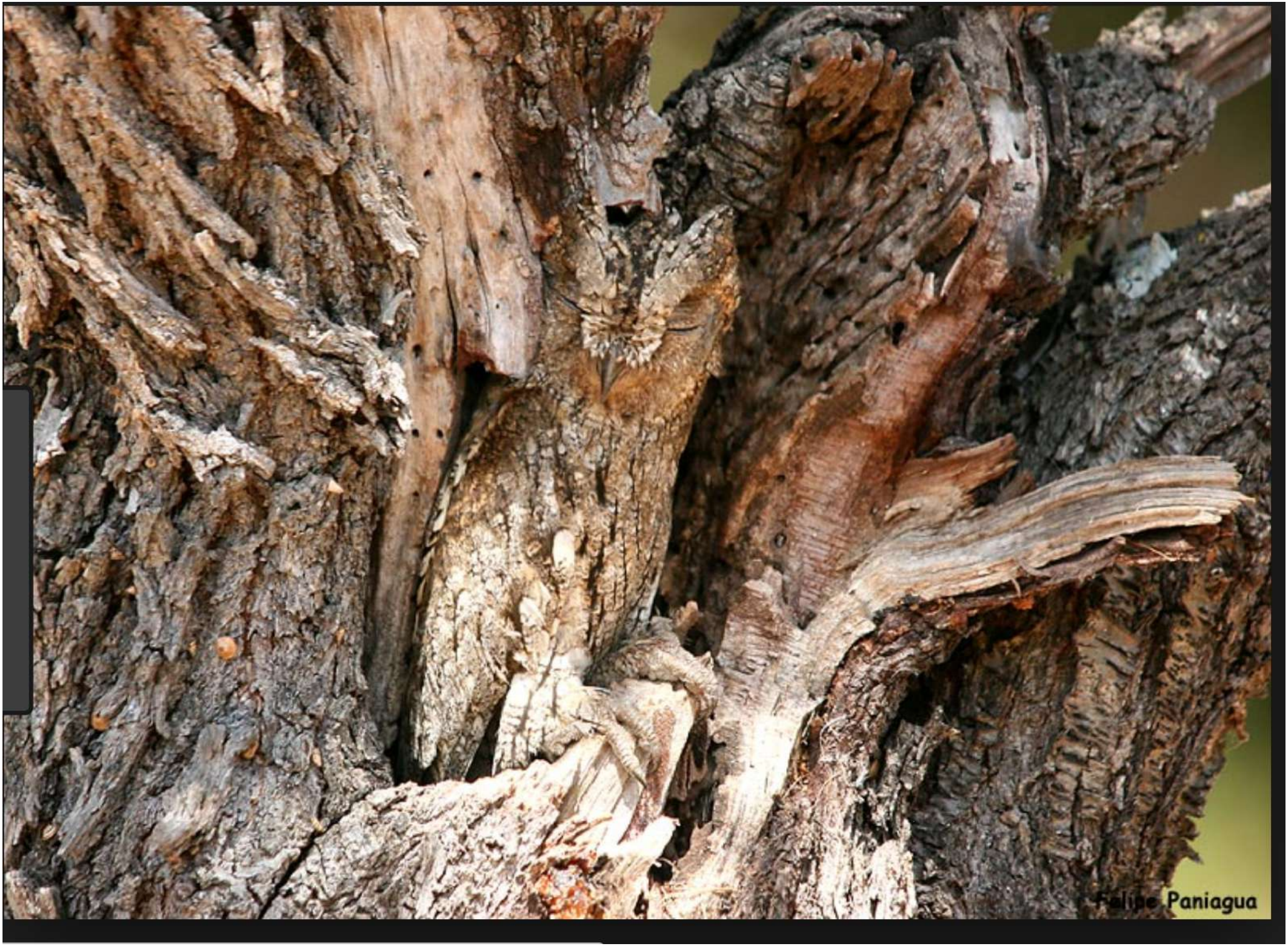
Camel spider, wind scorpion, sun spider, solifuges

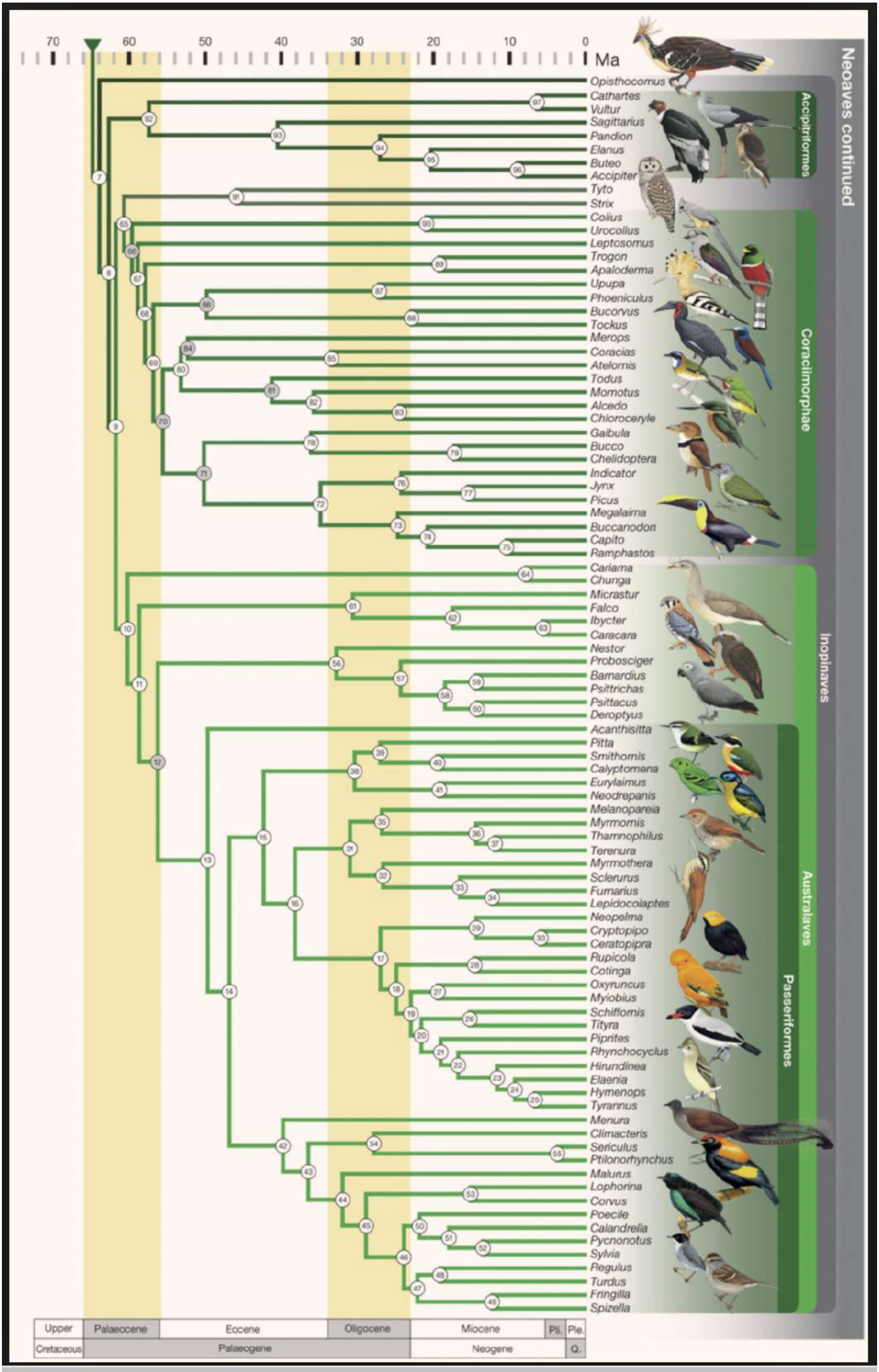
11. Camel spider – 15 cm (5.9 in)


VIA 9GAG.COM
Goliath Bird Eater Tarantula

Golden silk orb-weavers (Nephila)

10. Golden silk orb-weavers (*Nephila*) – 15 cm


Felipe Paniagua


70
60
50
40
30
20
10
0
Ma
Neoaves continued
Accipitriformes
Coraciimorphae
Inopinaves
Australaves
Passeriformes
Opisthocomus
Cathartes
Vultur
Sagittarius
Pandion
Elanus
Buteo
Accipiter
Tyto
Strix
Colius
Urocolius
Leptosomus
Trogon
Apaloderma
Upupa
Phoeniculus
Bucorvus
Tockus
Merops
Coracias
Atelornis
Todus
Momotus
Alcedo
Chloroceryle
Galbula
Bucco
Chelidoptera
Indicator
Jynx
Picus
Megalaima
Buccanodon
Capito
Ramphastos
Cariama
Chunga
Micrastur
Falco
Ibycter
Caracara
Nestor
Prosobsciger
Barnardius
Psittrichas
Psittacus
Deroptyus
Acanthisitta
Pitta
Smithornis
Calyptomena
Eurylaimus
Neodrepanis
Melanopareia
Myrmomis
Thamnophilus
Terenura
Myrmothera
Sclerurus
Furnarius
Lepidocolaptes
Neopelma
Cryptopipo
Ceratopipra
Rupicola
Cotinga
Oxyruncus
Myiobius
Schiffornis
Tityra
Piprites
Rhynchocyclus
Hirundinea
Elaenia
Hymenops
Tyrannus
Menura
Climacteris
Sericulus
Ptilonorhynchus
Malurus
Lophorina
Corvus
Poecile
Calandrella
Pycnonotus
Sylvia
Regulus
Turdus
Fringilla
Spizella
Upper
Cretaceous
Palaeocene
Eocene
Palaeogene
Oligocene
Miocene
Neogene
Plio.
Ple.
Q.

Grasshoppers are easy to catch and protein-rich.

Jim, the Photographer

Ants are everywhere, easy to catch, and actually taste good. They're also easy to find.

Maciej Forc / Flickr

Termites are a great source of protein, and since they live most of their lives buried away in wood, they are less likely to carry parasites than other insects.

This is probably the one you dreaded reading about. Grubs are very easy to find and collect, and some even taste not-disgusting.

Also called “sow bug”, “potato bug”, or “pill bug,” the wood louse is actually not a bug at all.

Pretty much everyone knows how to find earthworms, though few have probably eaten them.

Yep, believe it or not, stinkbugs are edible. They break the usual “don’t eat it if it smells bad” rule.

Scorpions are a common street food in China and can be found in California, Arizona, New Mexico and other Southwest states. They taste a bit like crab.


EARWIG

Aphids are tiny little insects that love sweet, sweet sap. They're very small—you could probably fit more than 50 on a penny.

Maggots are pretty gnarly and maybe not prime snack material. But they're edible, so they've got that going for them.

Katja Schulz / Flickr

Dragonflies have two life-cycle stages: nymph and adult. Both of these stages are edible—though one is much easier to catch than the other.

bgy23 / Flickr

Which bugs are safe to eat and where can I find them?

Name of Insect	Where Can I Find Them?	Peak Season?	Active Day or Night?	Cook Them?
Grasshoppers and Crickets	In grass	Summer months (can be found year-round)	Grasshoppers day; crickets night	Yes; pull off head and legs
Ants	Everwhere	Weather-dependent: after rainstorms and during droughts	Day	Yes
Termites	in decomposing wood	Spring	Day	Yes
Grubs	In rotting logs; one to two inches deep in loamy soil	Late summer/early fall	Either (they're eggs, so they're really not on the move)	Can be eaten raw, but yes, cook them
Woodlice	In rotting vegetation (like a pile of leaves or dead wood)	Spring, autumn and winter	Day	Yes
Earthworms	In dirt (or above ground if it's just rained)	Spring (when it's wet)	Day	Yes
Stinkbugs	Around crops and gardens	March - September	Night	Yes
Scorpions	In dens; under logs, wood, clutter	Most active in the summer (can be found year-round; usually inactive in the winter)	Night	Yes; cut off stinger
Earwigs	Under rocks; in dark, damp places	Fall (can be found year-round)	Either	Yes
Aphids	On plants	Spring	Day	Yes
Maggots	In carrion; under wood; in fruits and veggies	Black fly maggots peak late May/earlyJune	Either	Can be eaten raw, but yes, cook them
Dragonflies	Near water sources	Spring/summer	Day	Yes, pull off wings and legs

Edible Bugs You Probably Want to Avoid

These bugs are edible, but either harder to find or riskier to collect and eat. You may want to exercise caution before eating these—or at least know what you're getting yourself into.

- Slugs and snails
- Tarantulas
- Bees and wasps
- Caterpillars

Slugs and Snails

While their flesh is benign, there's a high enough likelihood that they've fed on something toxic—like poisonous plants or mushrooms—to make eating them inadvisable. The ones that you eat in a restaurant have been fed safe-to-eat plants; the people preparing them know exactly what those snails were eating. The same can't be said of an in-the-wild snail's diet. If you wild snails or slugs, you risk contracting rat lungworm, which can turn into eosinophilic meningitis (causing severe brain and nervous system damage). These diseases usually hide in the digestive tract of the slugs and snails, so cooking them won't necessarily guarantee that they're disease-free system. If snails are your only meal option, you can also feed them plants you know aren't poisonous for a week before eating them. Then be sure to cook them thoroughly.

While their flesh is benign, there's a high enough likelihood that they've fed on poisonous plants or mushrooms to make eating them inadvisable.

David Rynde / Flickr

Tarantulas

Tarantulas

Fun fact: fried spider is a delicacy in Cambodia. Remove as much hair as you can, and don't eat the fangs. If you cook them, curled legs are an indicator of how done they are and how well cooked the insides are. One of the most common edible spiders is the Thai zebra spider, but it is venomous and aggressive.

Remove as much hair as you can, and don't eat the fangs.
Bart van Dorn / Flickr

Bees and Wasps

Cut off the stingers and legs. Cook well. But be forewarned: These fliers are dangerous to catch. If risking stings is worth it (or you don't have another choice), you can try plugging the hive, and then smoke the whole thing with some sort of improvised torch to kill everything inside. These are on the "honorable mention" list only because they're hard to catch and will attack you without remorse. That said, bee larvae can be eaten, and they're less likely to fight back.

Cut off the stingers and cook well.
Andy Murray / Flickr

Caterpillars

Some are toxic, like the giant silkworm moth and the puss caterpillar. Bright ones and hairy ones tend to be toxic, but that isn't a set-in-stone rule. So either do some research about the area you plan to be stranded in or proceed with extreme caution. If you're stranded and looking to survive, this probably isn't the best gamble.

Some are toxic, so either do some research about the area you plan to be stranded in or proceed with extreme caution.
tinkerbrad / Flickr

Which Bugs Shouldn't I Eat and Why?

Bug	Don't Eat It Because...
Slugs and Snails	You don't know what they ate. They love eating poisonous plants. Cooking them doesn't boil out this poison. They also carry rat lung worm (and it's as awful as it sounds).
Tarantulas	They have no qualms about jumping on you and attacking you. They're aggressive.
Bees and Wasps	These guys will kamakaze you. You could get stung by them. Other insects are likely more readily available, and they're definitely less likely to attack back
Caterpillars	Some are toxic, and unless you know which is which beforehand, now is probably not the time to guess wildly.

Telltale Signs a Bug Might Kill You

While the majority of bugs are safe to eat, there are a few precautions you should take:

- **Avoid Bright Colors:** Don't eat any insects that are brightly colored; their coloration is a warning to predators that they're toxic. That even goes for the insects on this list.
- **Avoid Hairy Things:** Avoid hairy bugs; there may be stingers nestled in the fuzz.
- **Avoid Smelly Things:** Also avoid any bugs that have a potent smell (except, paradoxically, stinkbugs).


Front Range First Defense
10 UCO Stormproof Matches
40ft of 6lb Monofilament Fishing Line
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(4) 1 MINUTE BURN FIRE TINDER
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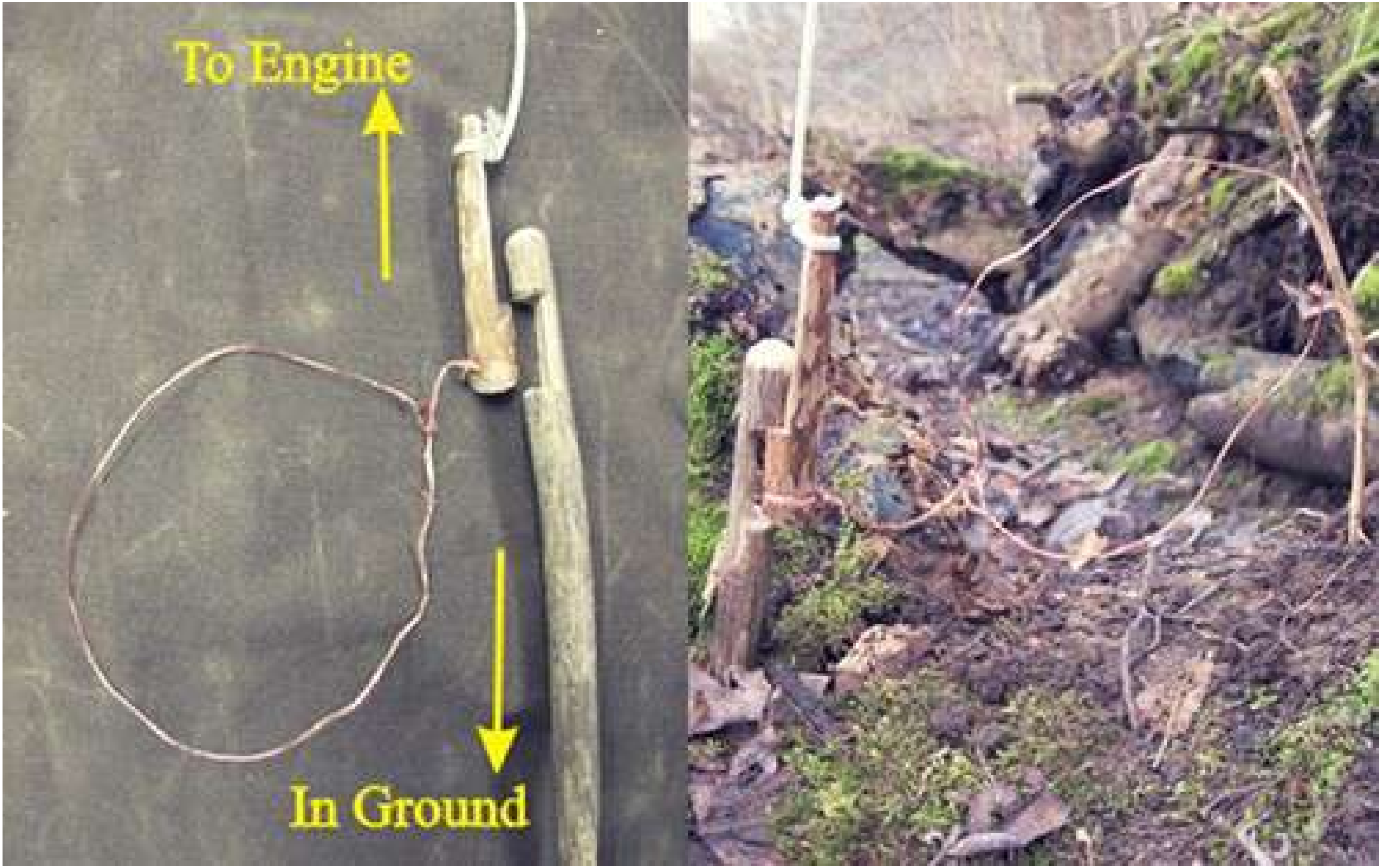
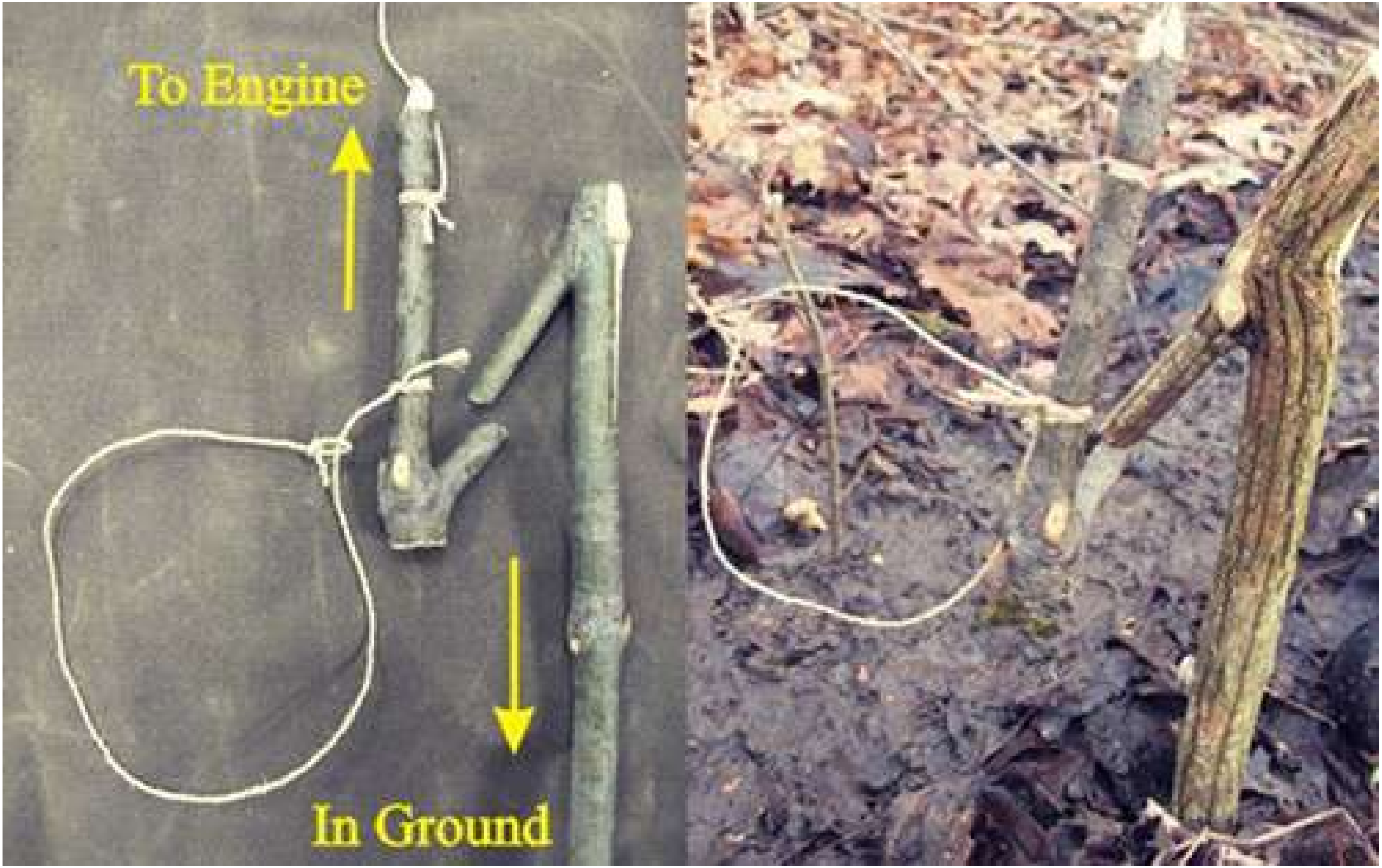
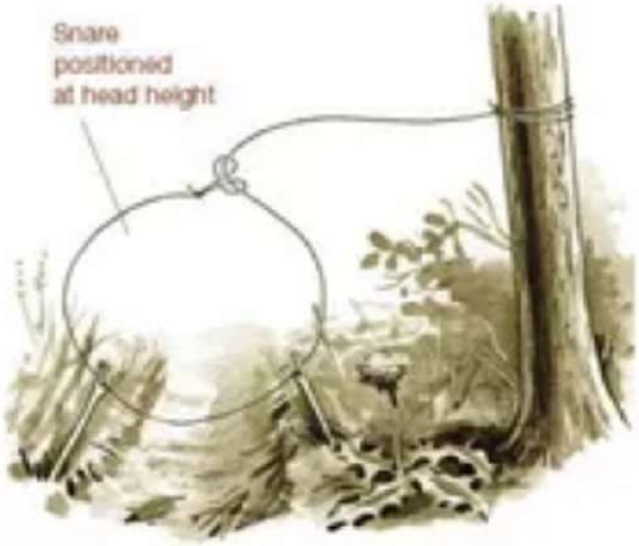
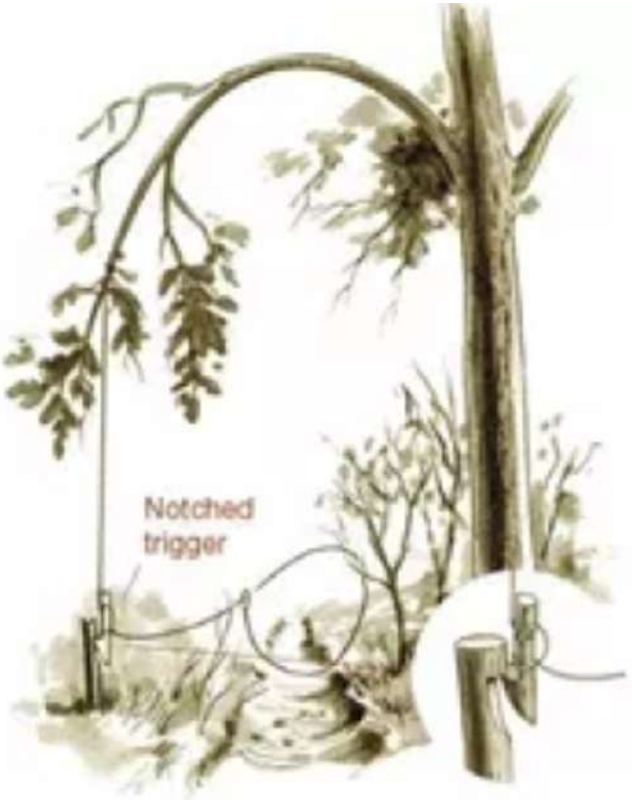
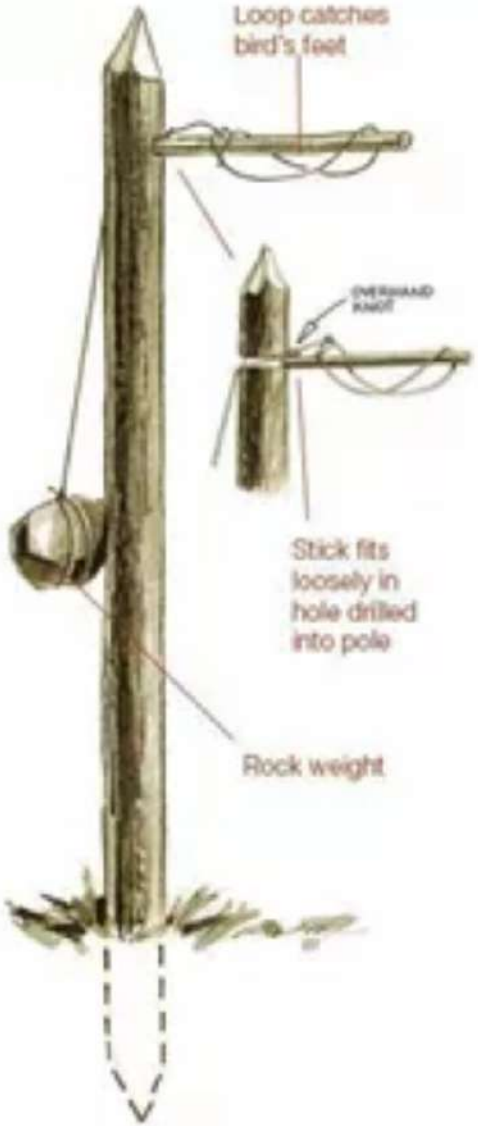

To Engine
In Ground

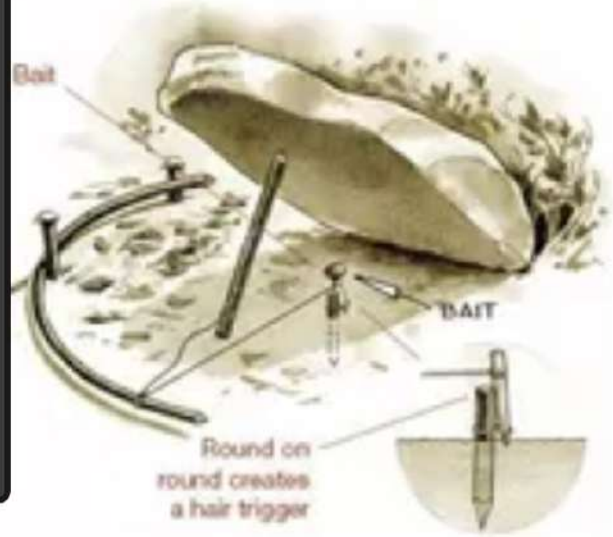

To Engine
In Ground

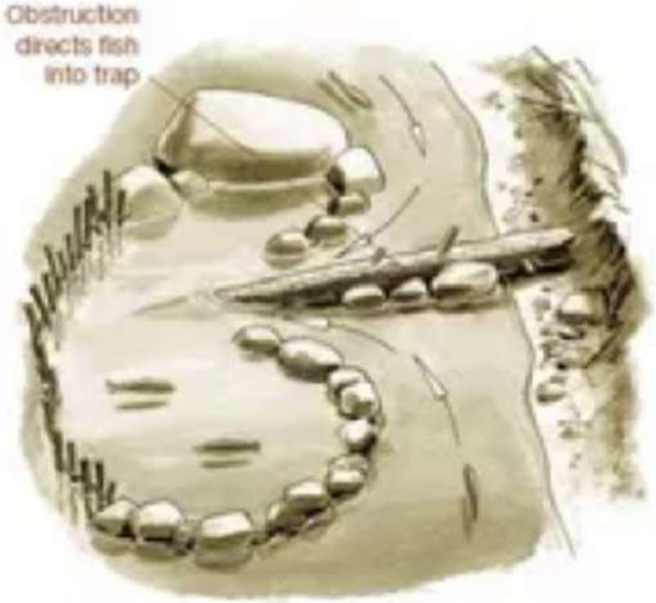

To Engine
In Ground

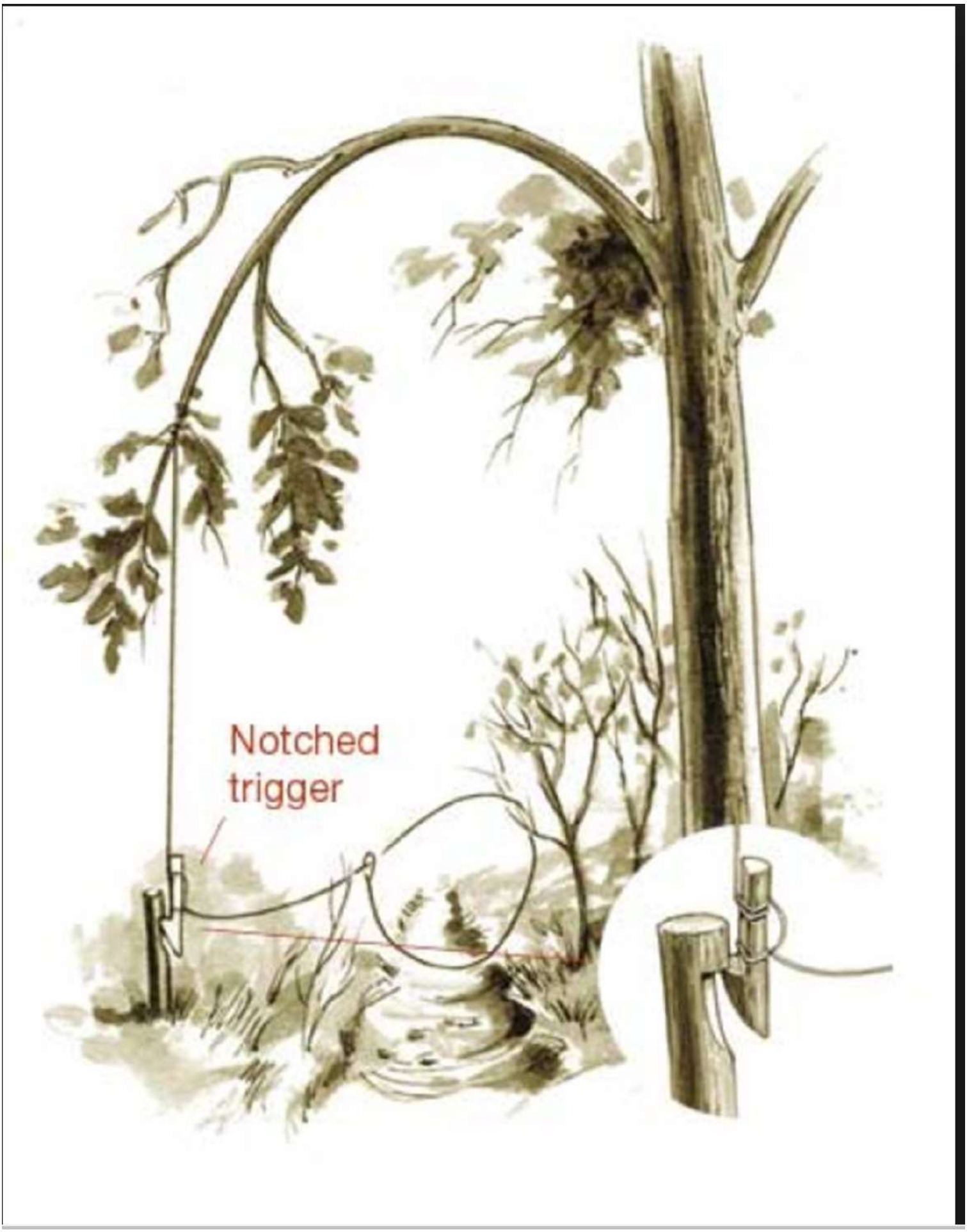

Snare
positioned
at head height

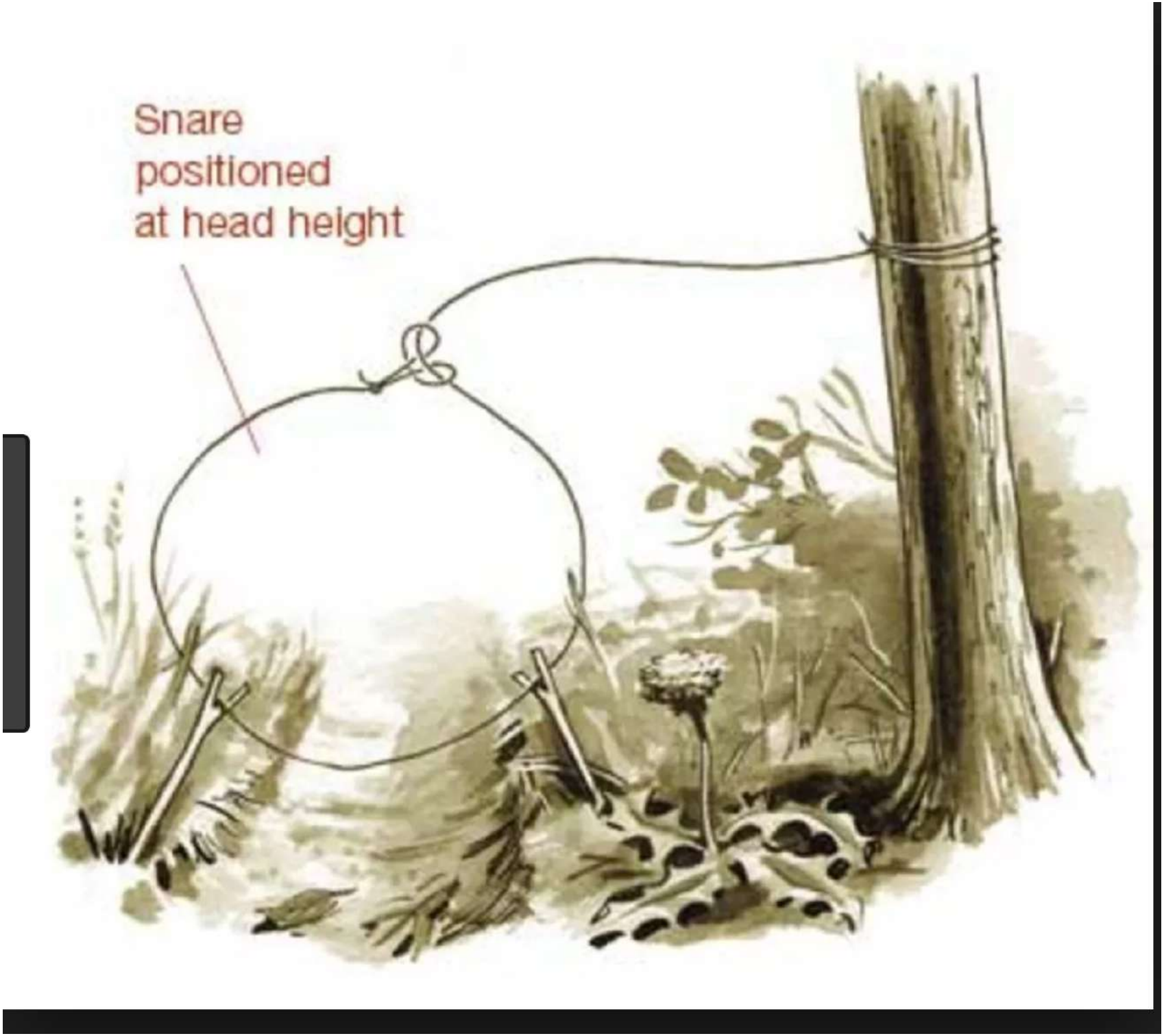

Notched
trigger

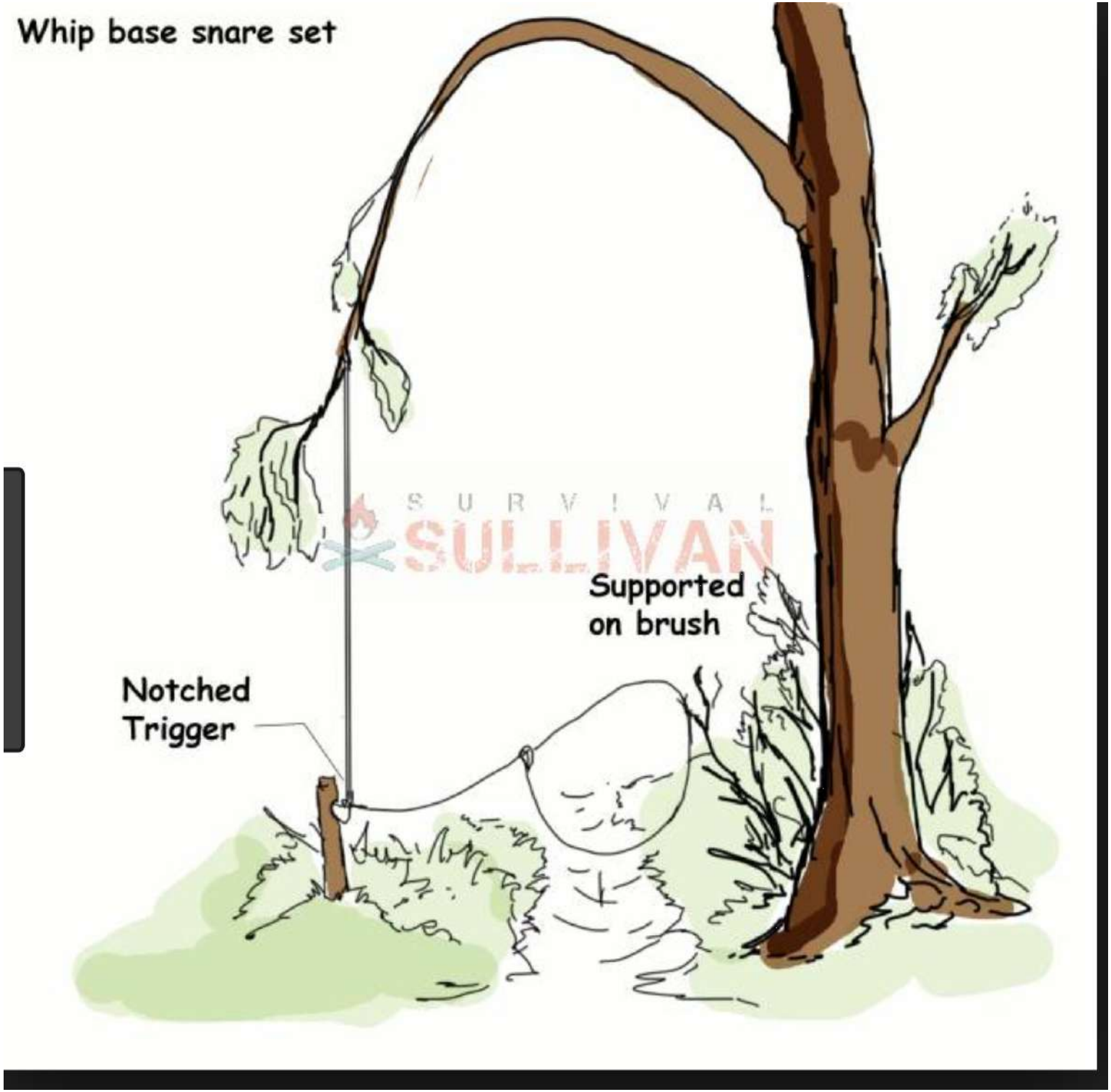

Loop catches
bird's feet
OVERHAND
KNOT
Stick fits
loosely in
hole drilled
into pole
Rock weight

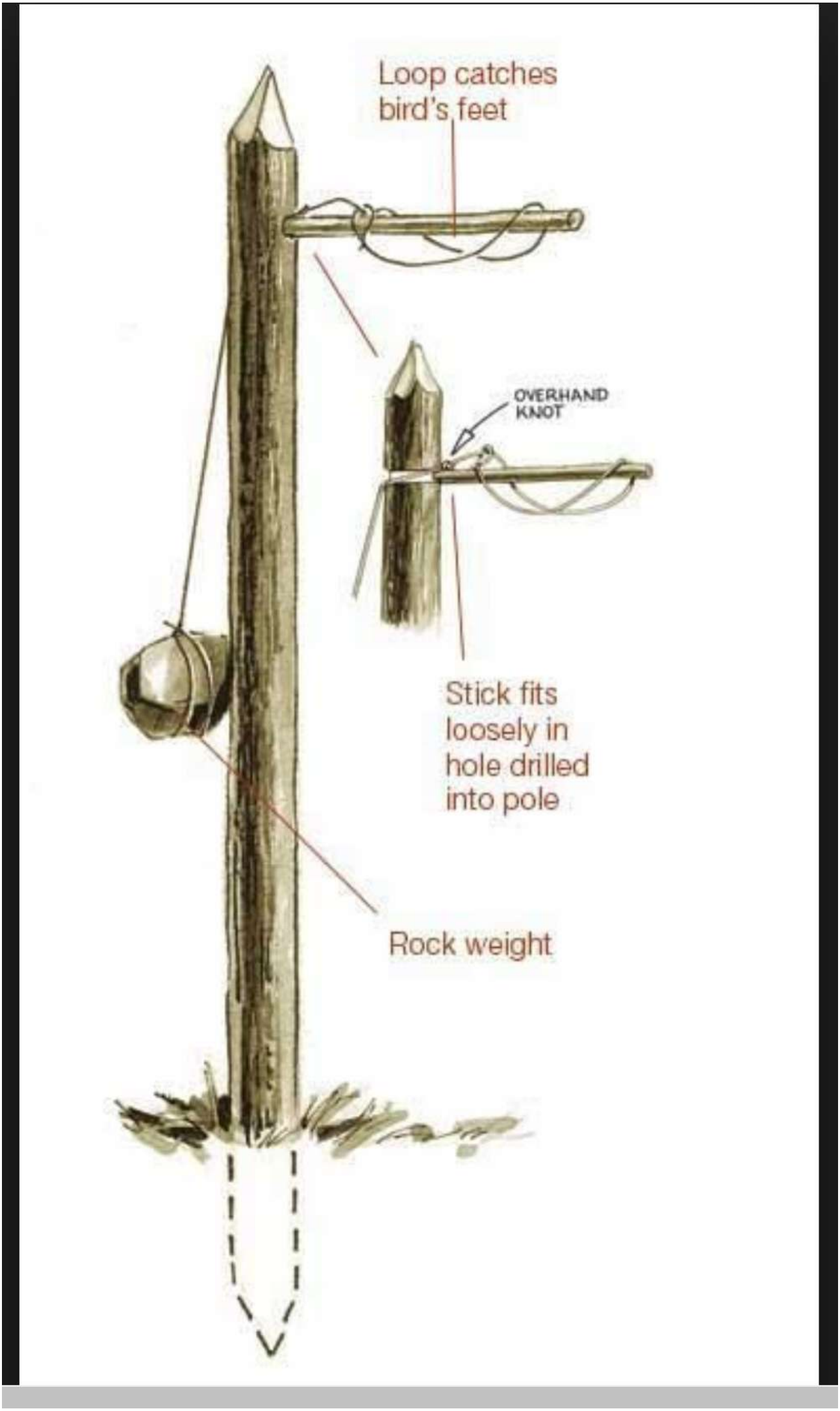

Bait
BAIT
Round on
round creates
a hair trigger

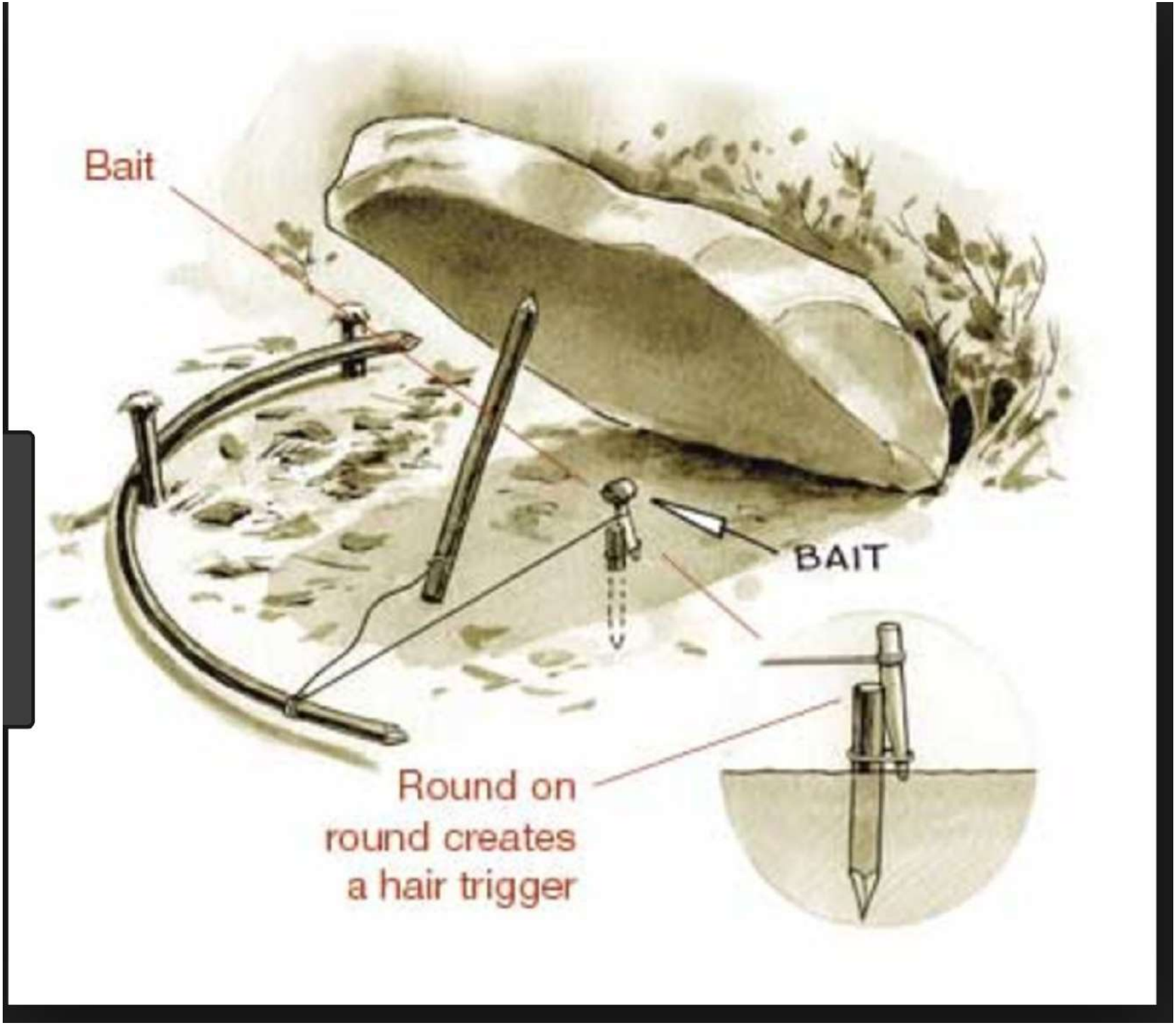

Obstruction
directs fish
into trap

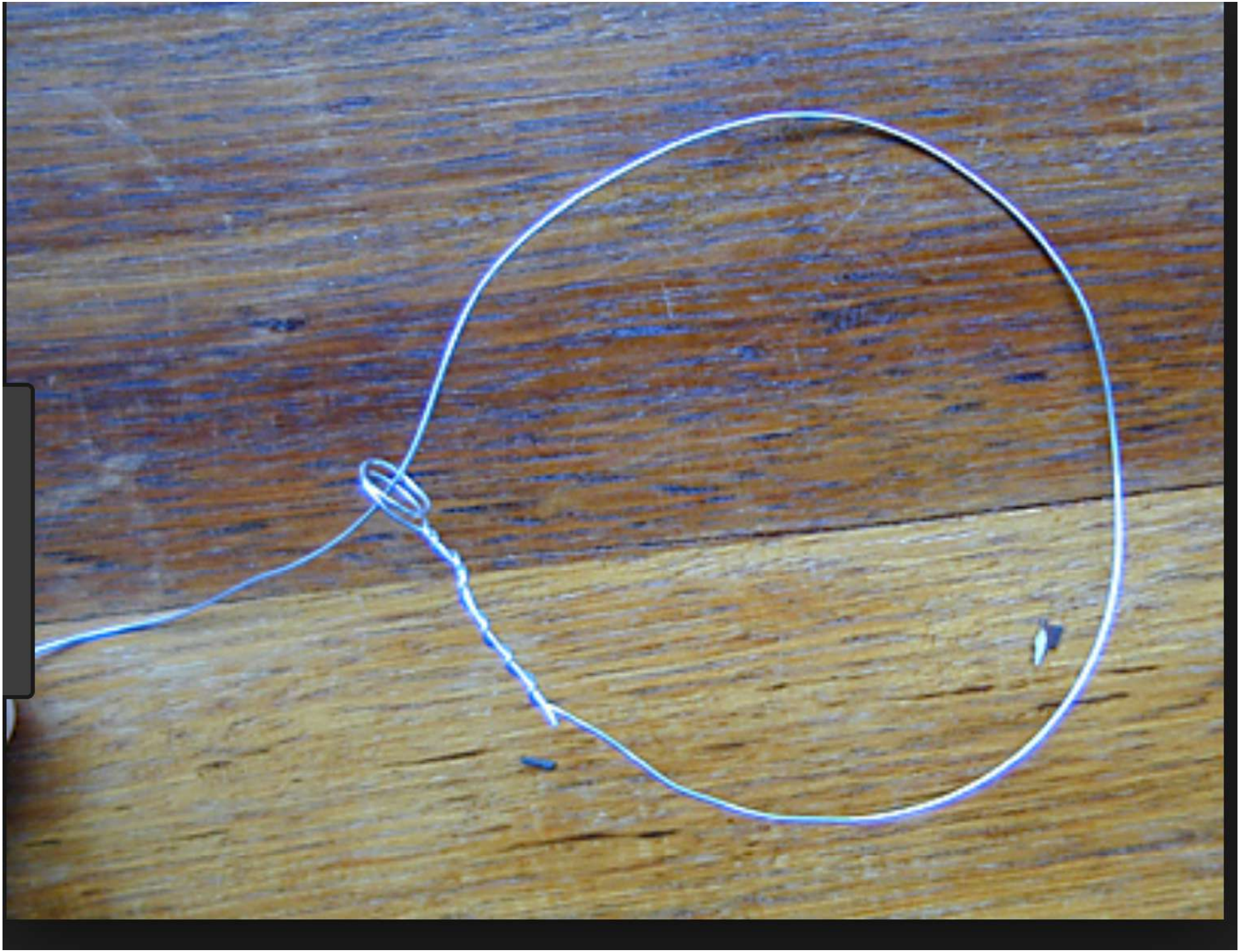

Notched
trigger

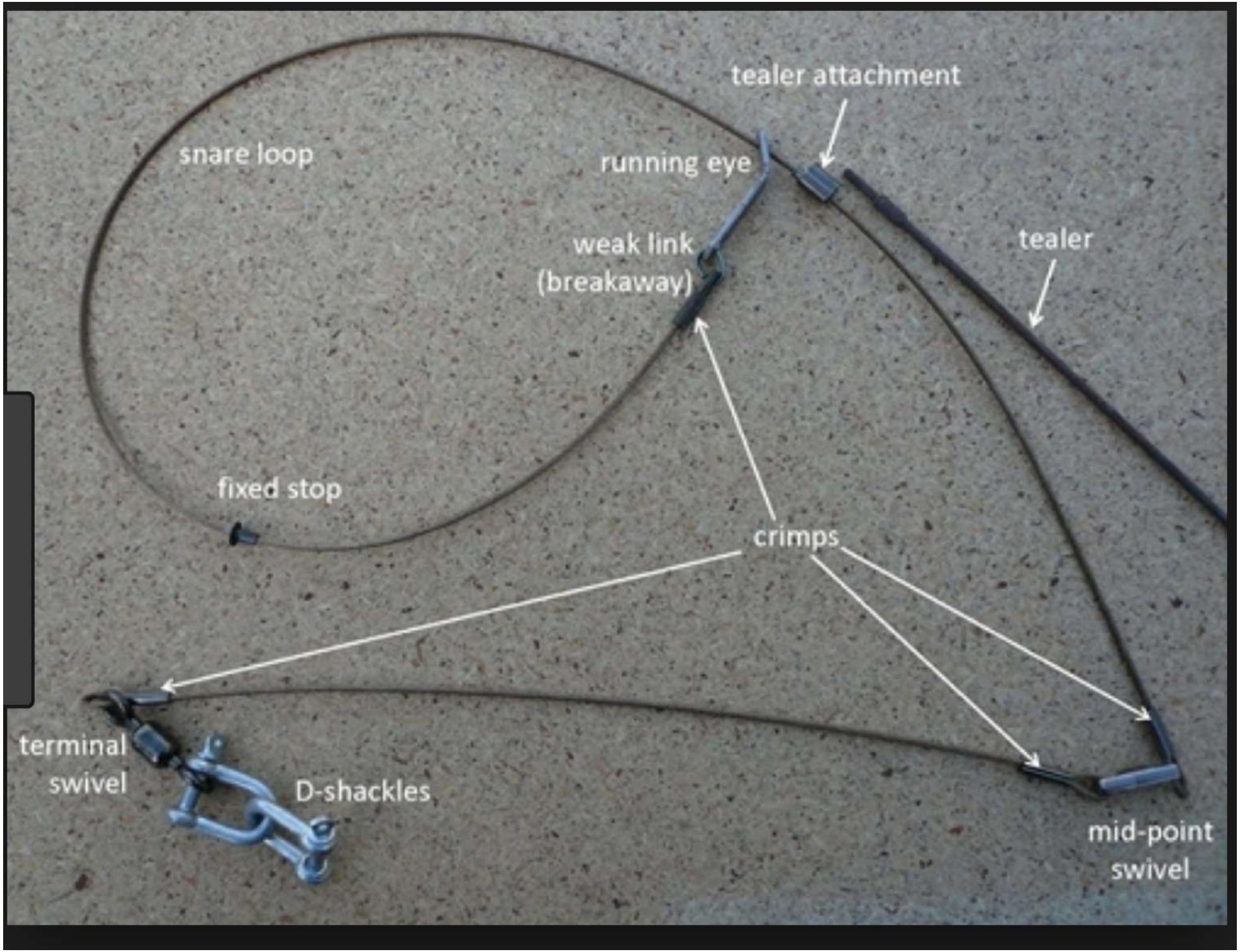

Snare
positioned
at head height


Whip base snare set
SURVIVAL
SULLIVAN
Supported
on brush
Notched
Trigger

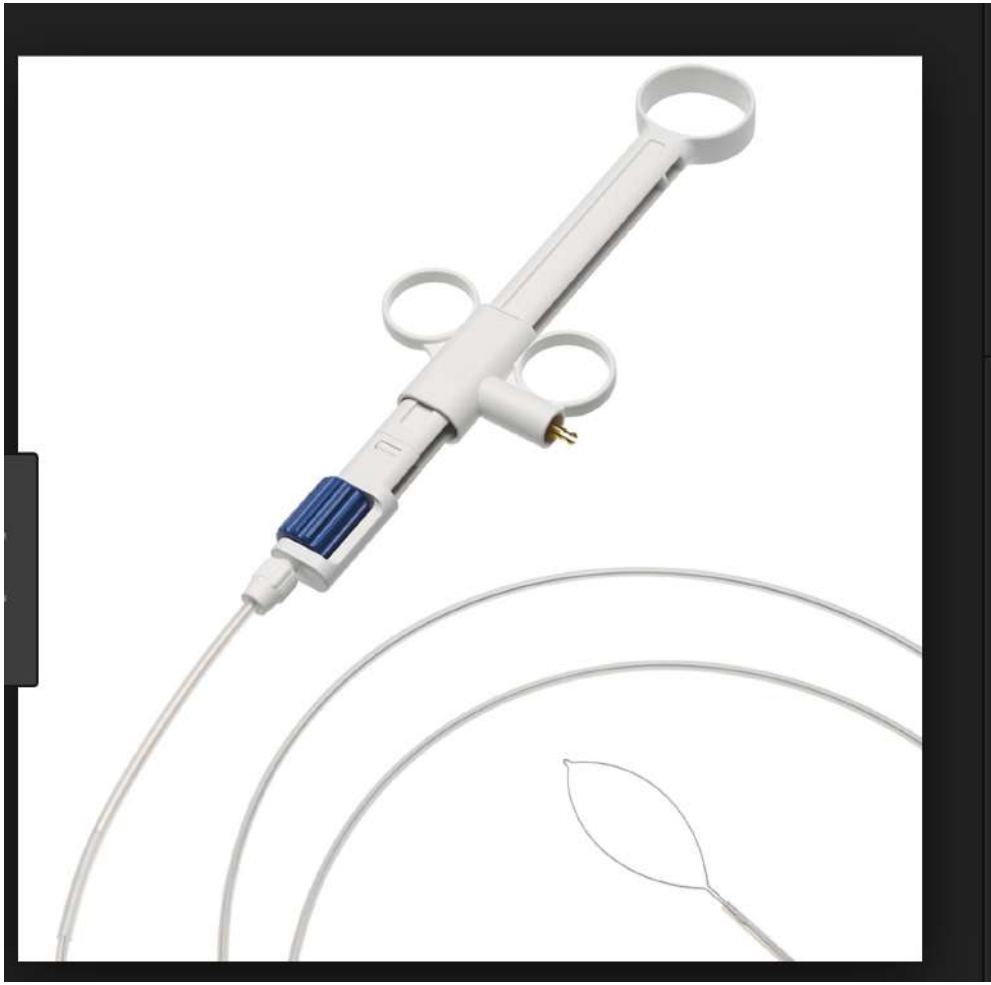

Loop catches bird's feet
OVERHAND KNOT
Stick fits loosely in hole drilled into pole
Rock weight


Bait
BAIT
Round on
round creates
a hair trigger




tealer attachment
snare loop
running eye
weak link
(breakaway)
tealer
fixed stop
crimps
terminal
swivel
D-shackles
mid-point
swivel


MANUFACTURED AT THE SNARE SHOP
THE SNARE SHOP



Single-Use Rotatable Snare - Boston S..

bostonscientific.com

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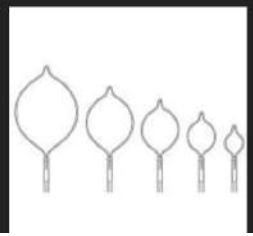
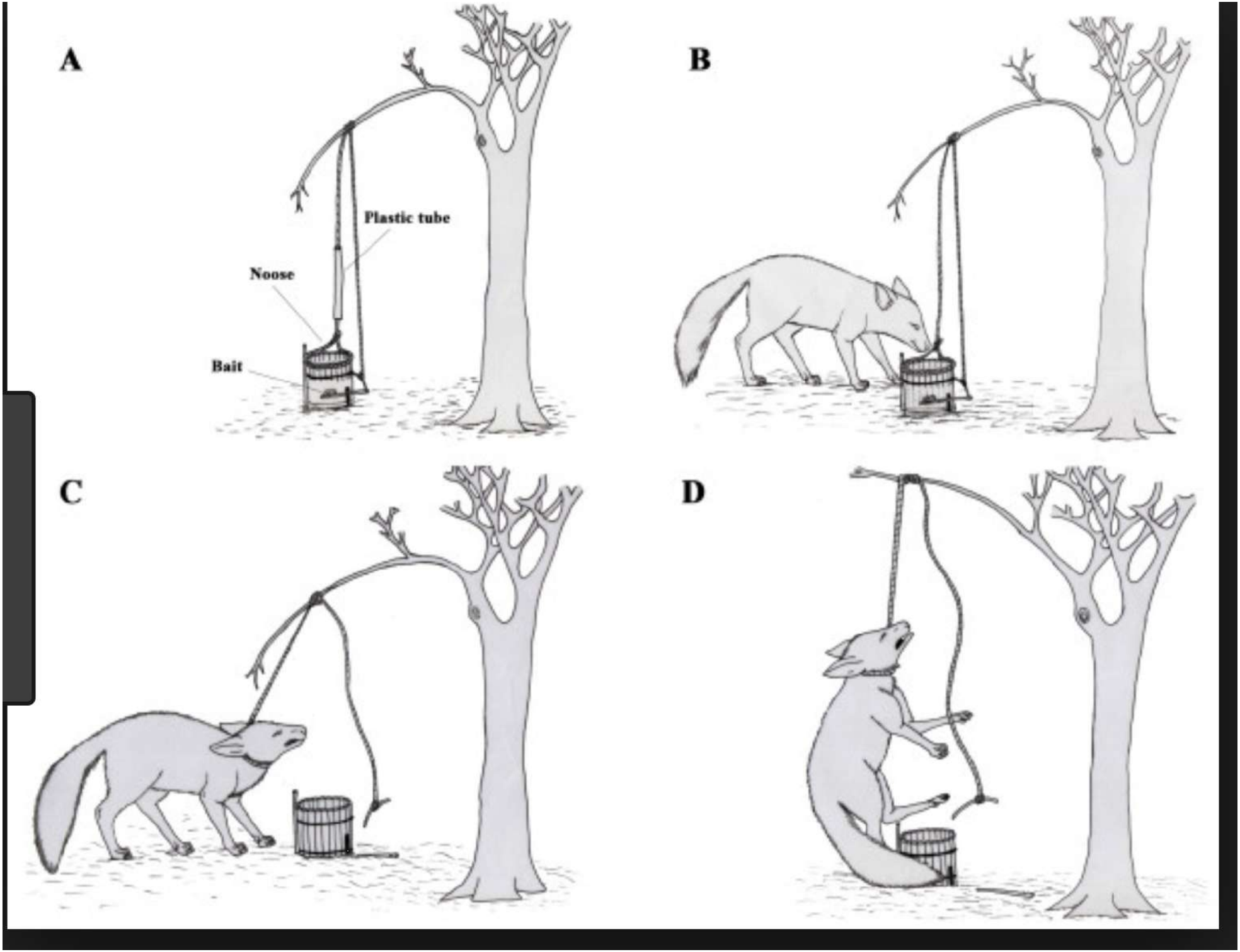
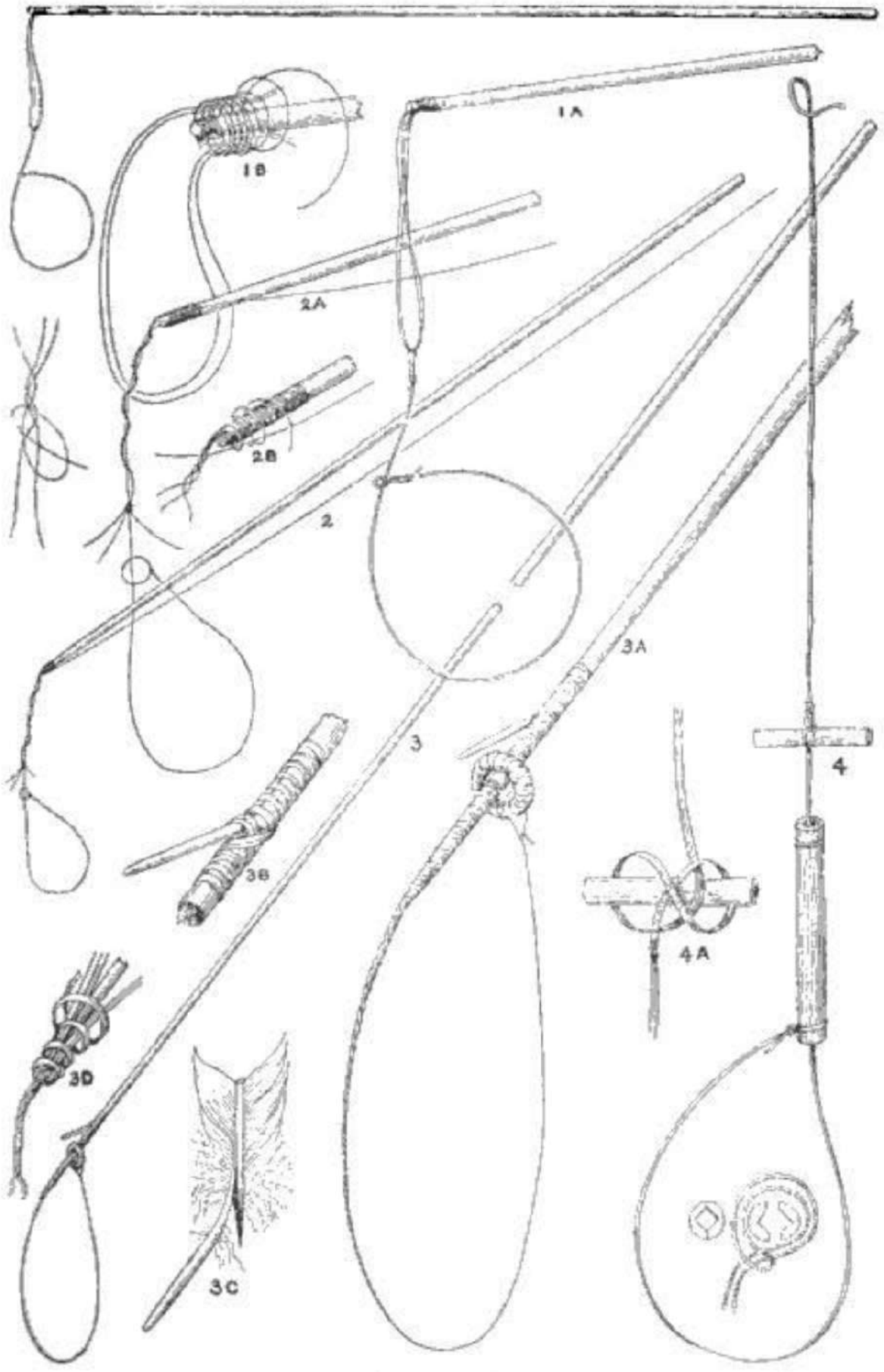



A
Plastic tube
Noose
Bait
B
C
D

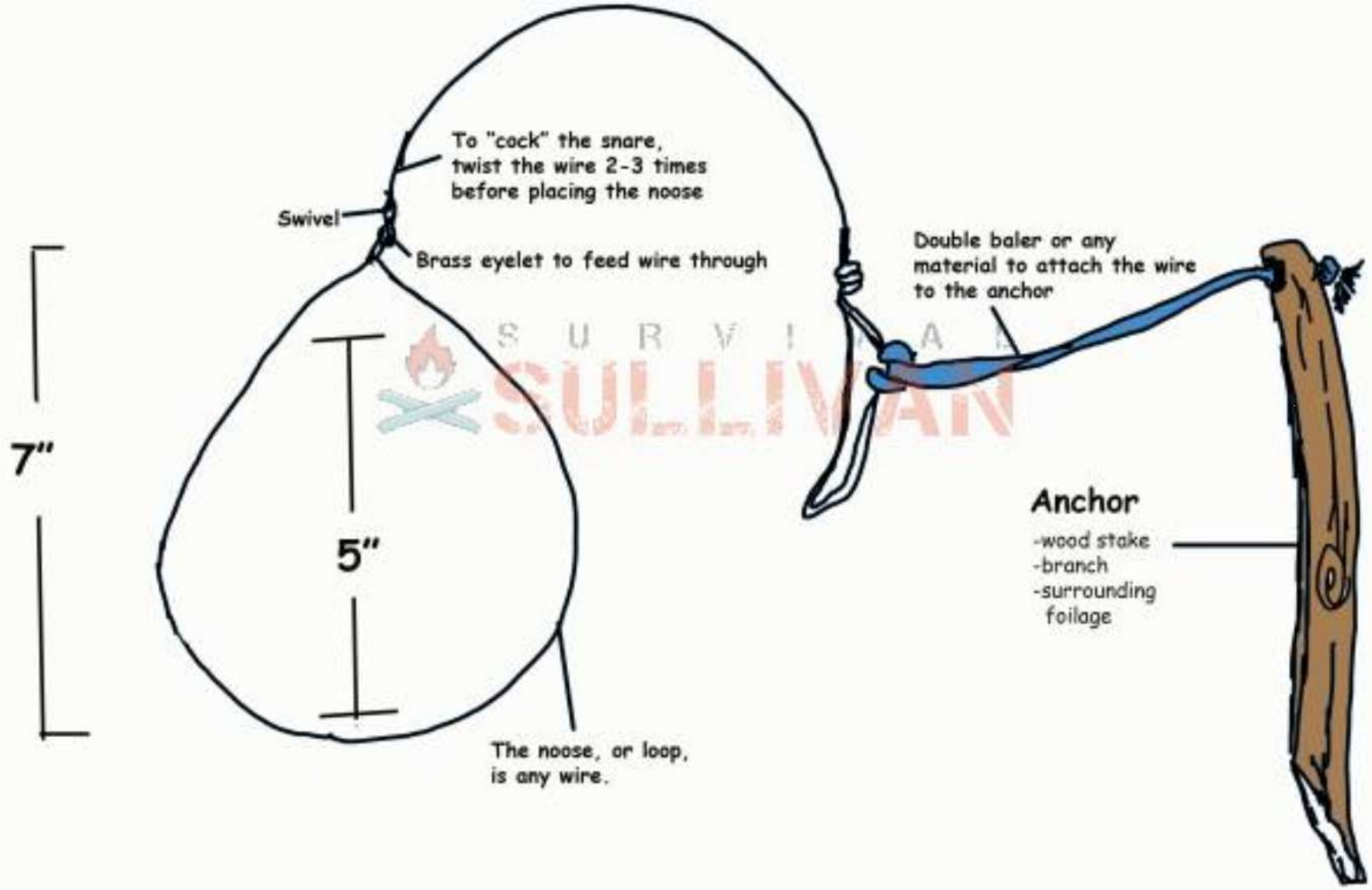


TRAPS OF THE AMERICAN INDIANS STEPS OF AUTOMATISM IN THE GRASPING DEVICE.

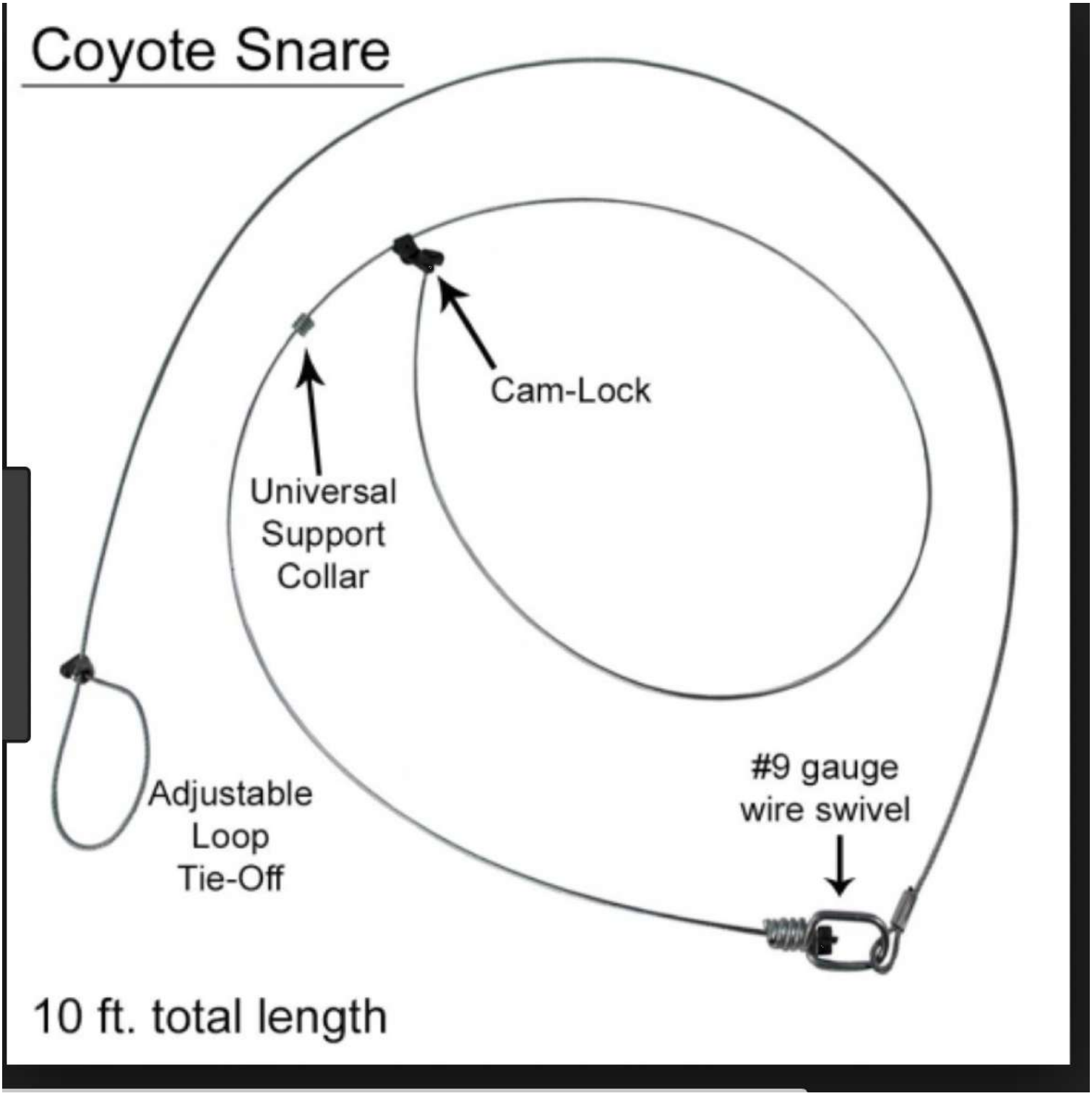
1, Common dull. 2, dull and tickler. 3, dull and ratchet. 4, complex mousetrap

(Courtesy Smithsonian Institution.)

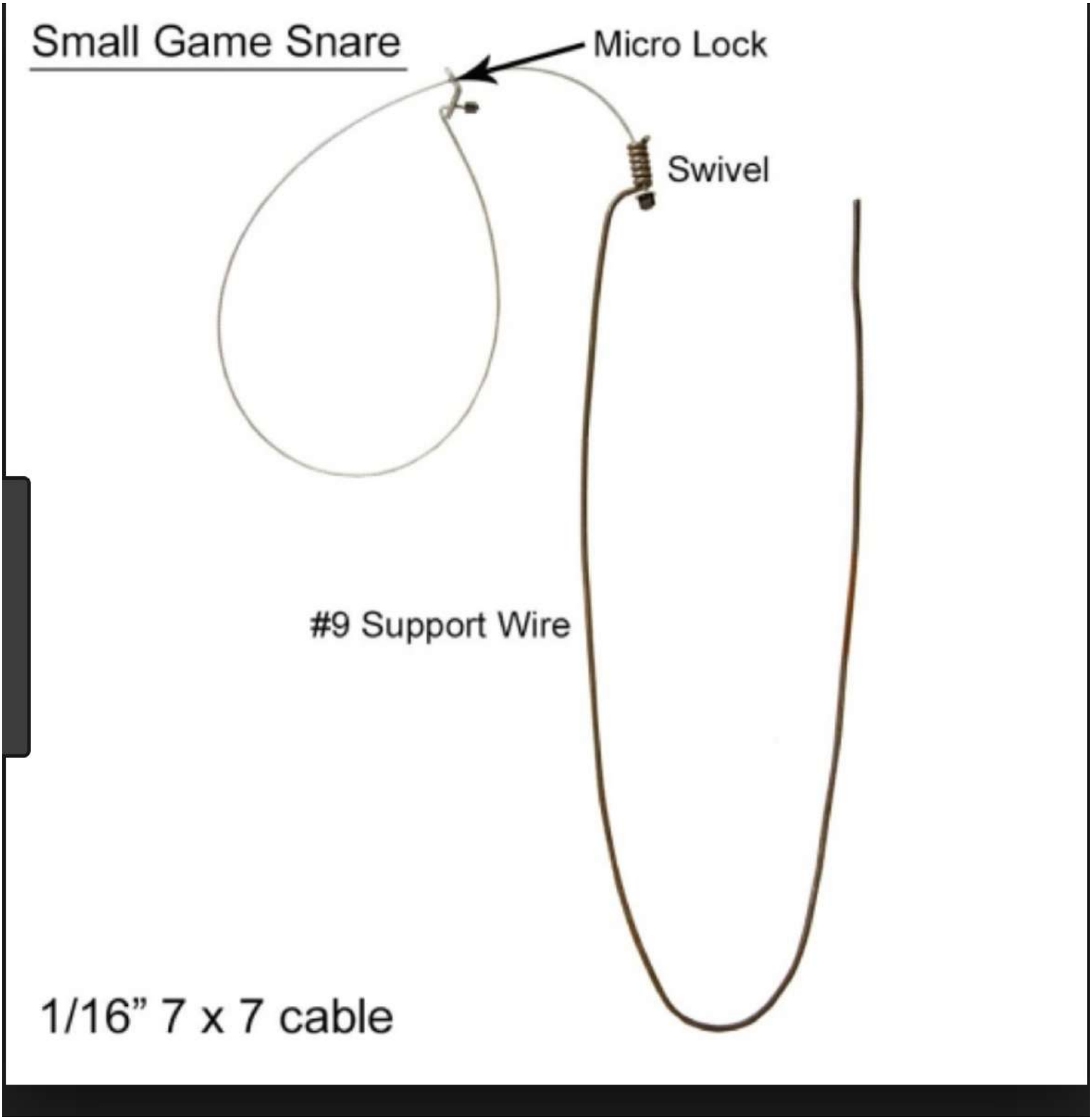
The Basic Anatomy of a Rabbit Snare

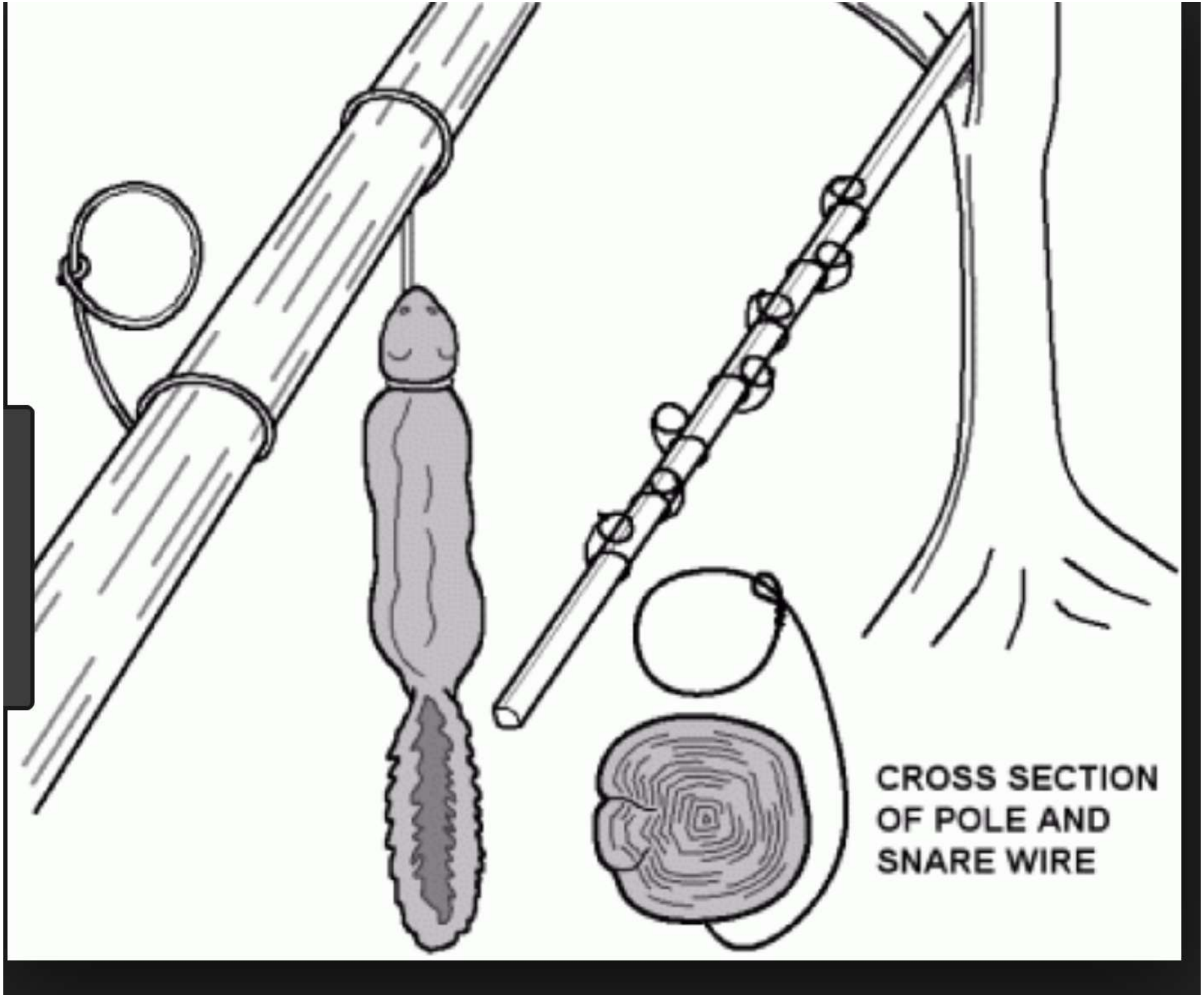


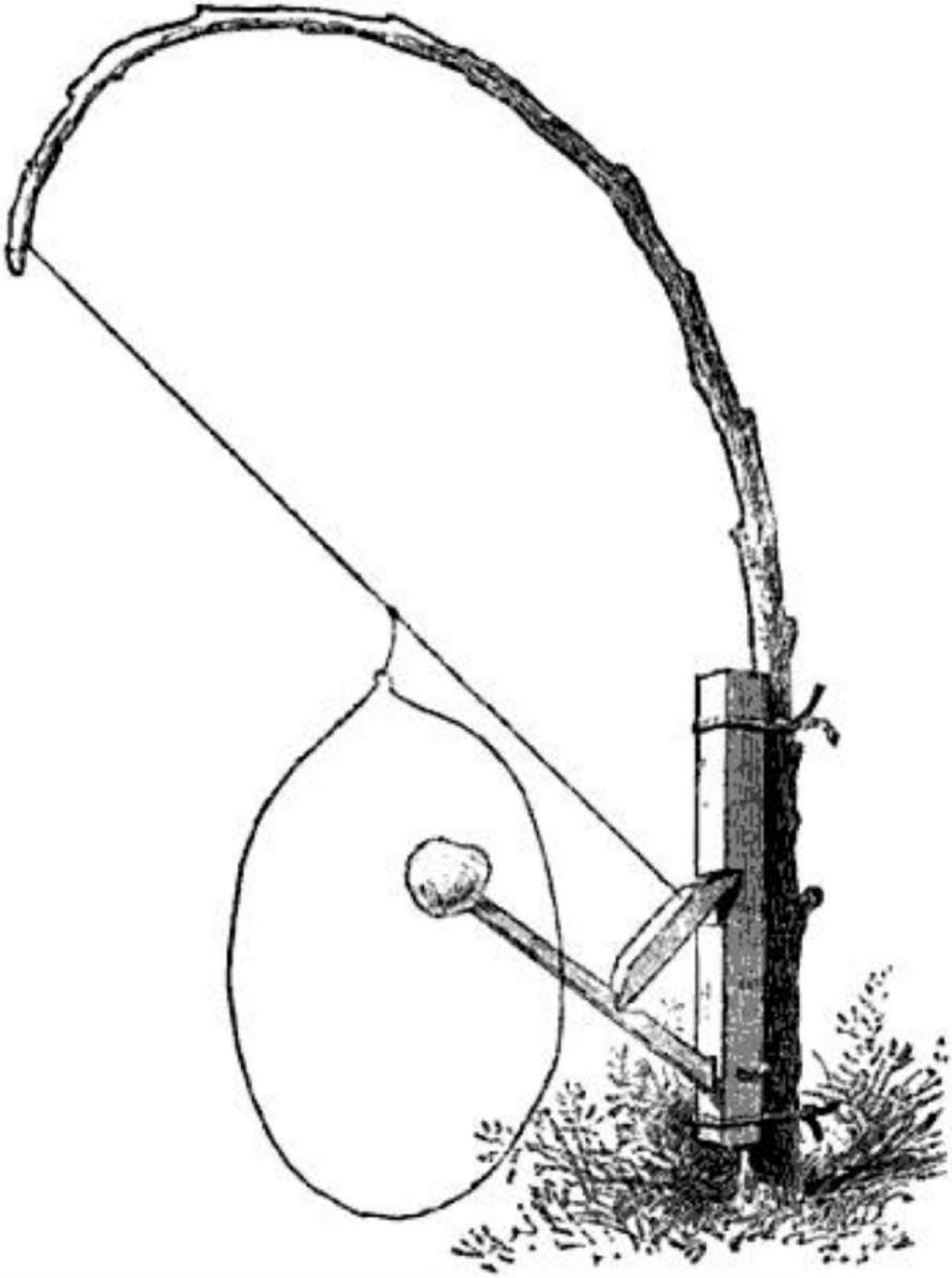
Coyote Snare



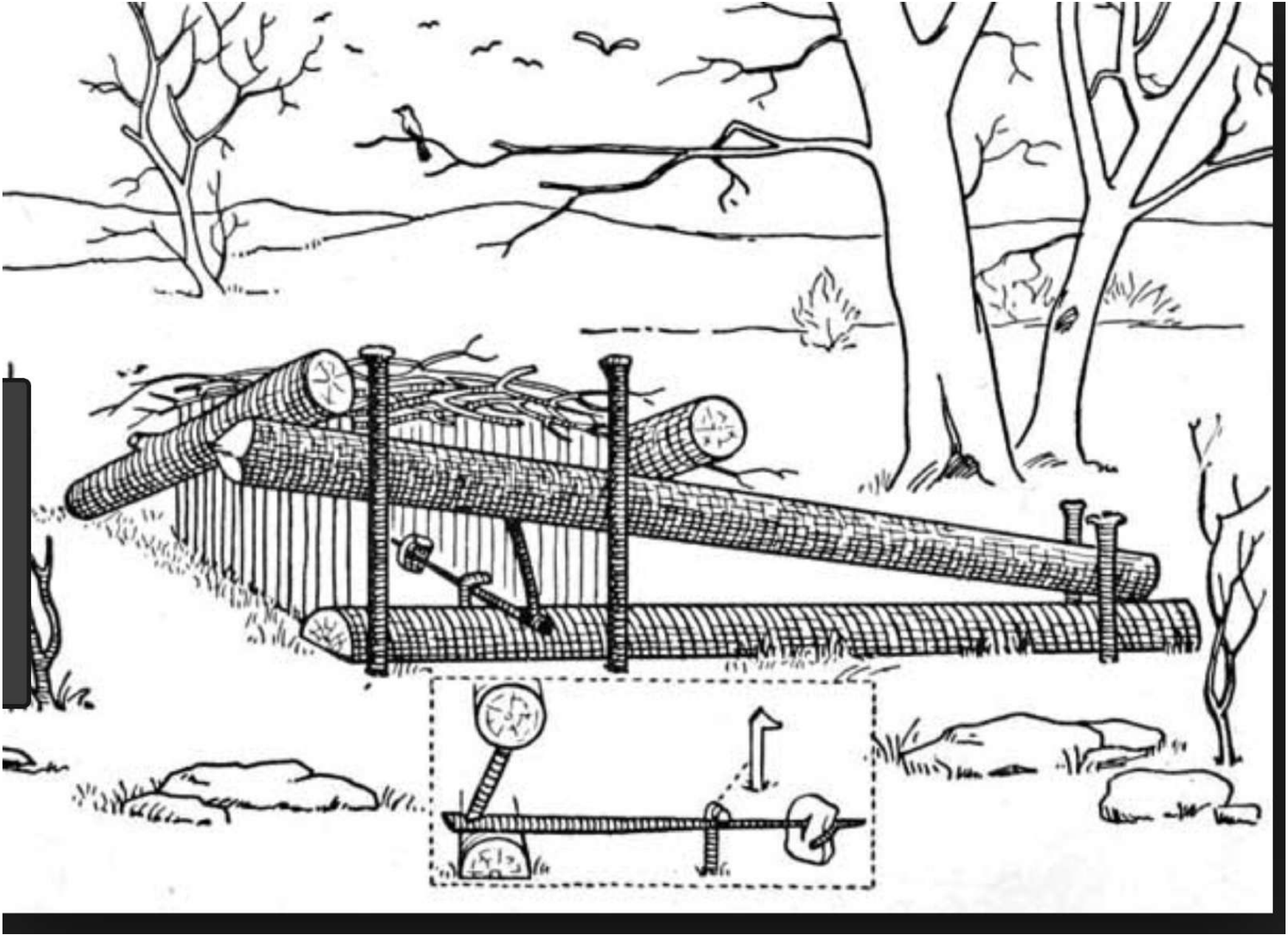
10 ft. total length


Small Game Snare
Micro Lock
Swivel
#9 Support Wire
1/16” 7 x 7 cable


CROSS SECTION
OF POLE AND
SNARE WIRE



dia.org/wiki/File:19th_century_knowledge_traps_and_snares_portable_snare_1.jpg



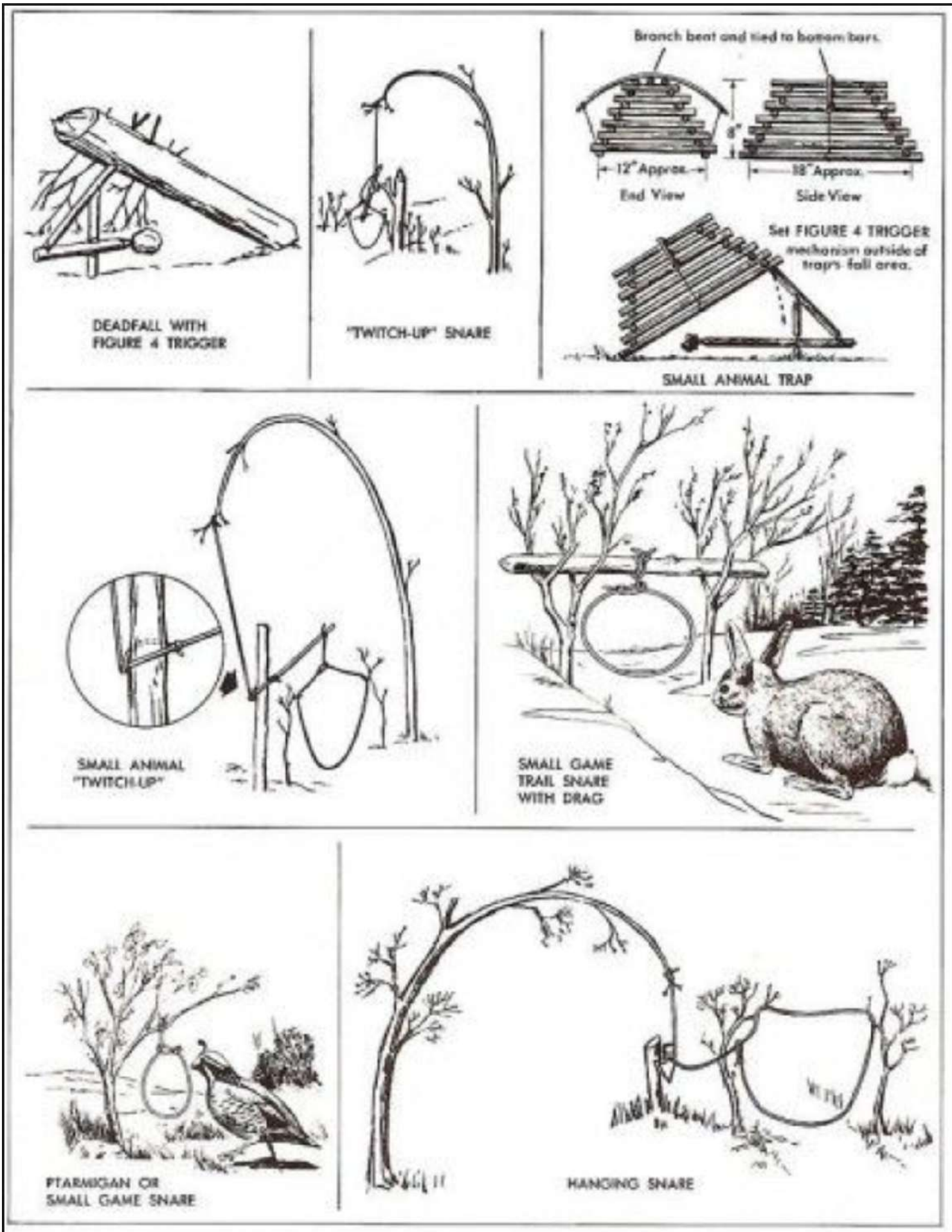
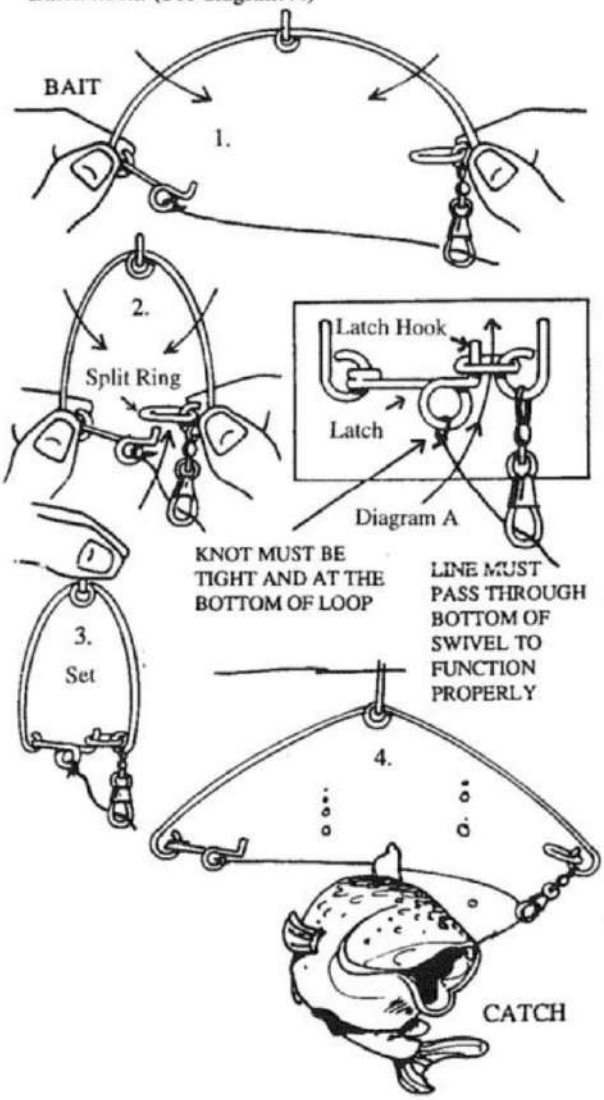
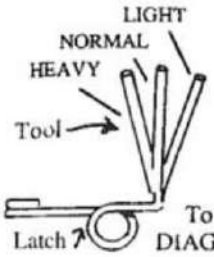


Figure 2-29. Traps, Snares, and Deadfalls for Small Animals

ALWAYS BAIT HOOK FIRST BEFORE SETTING

To set speedhook, bring spring arms together until you can put latch hook into BOTTOM of SPLIT RING. Latch hook. (See diagram A)

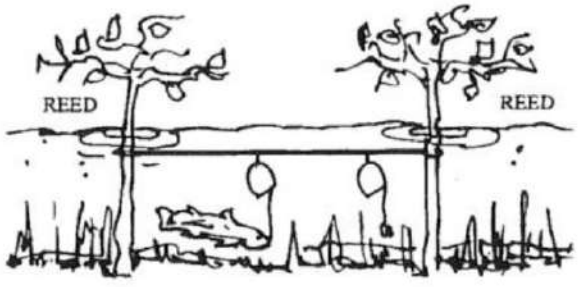


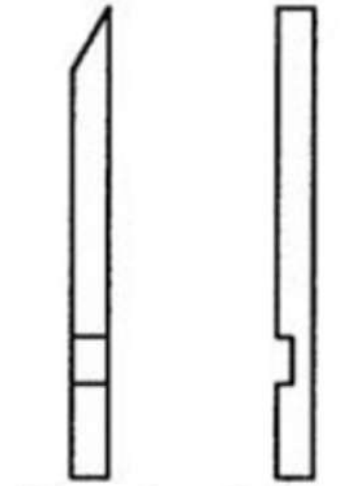


To Set Tension
DIAGRAM B

Tool is in plastic bag with dehydrated bait.

To set tension you must bend latch hook inward to tighten, or outward to loosen. (see diagram B) Inward would be used in rushing water or when speedhook trips prematurely. Outward would be used for ice fishing or catching very small fish: (Outward requires less force to trip.) To replace line on latch, knot must be tied against latch loop and must go through safety snap swivel. (see diagram A)

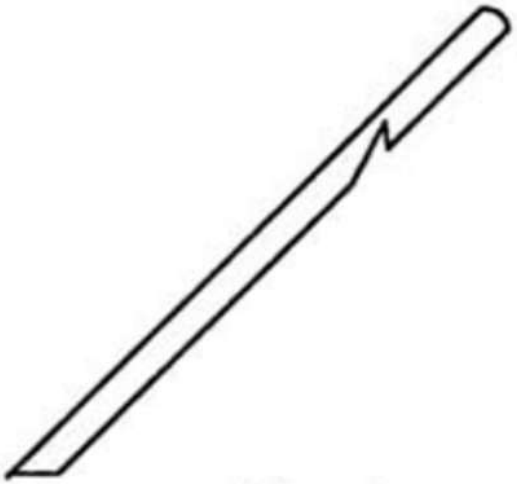




Front View

Side View

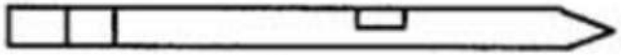
Upright Stick



Front View

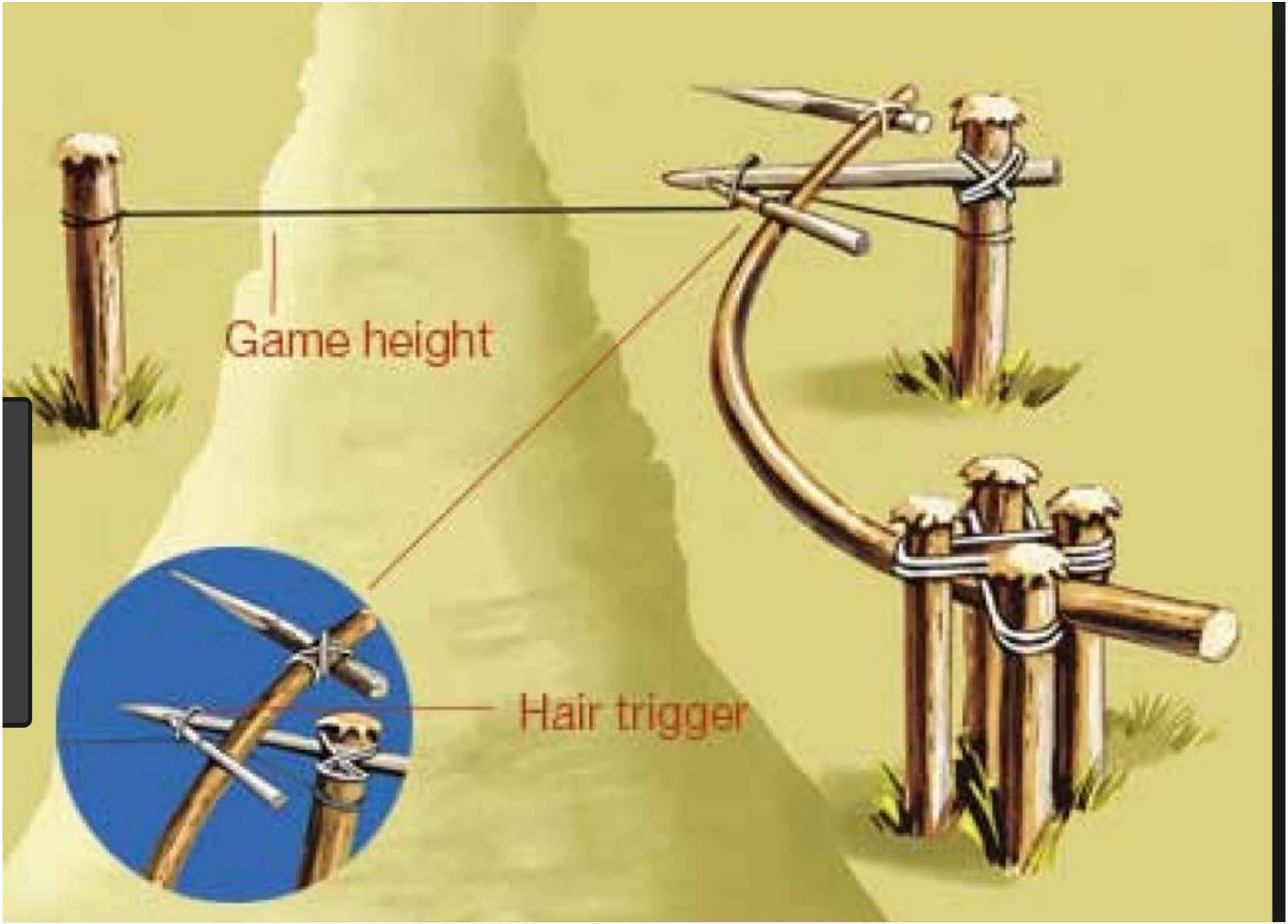
Release Stick

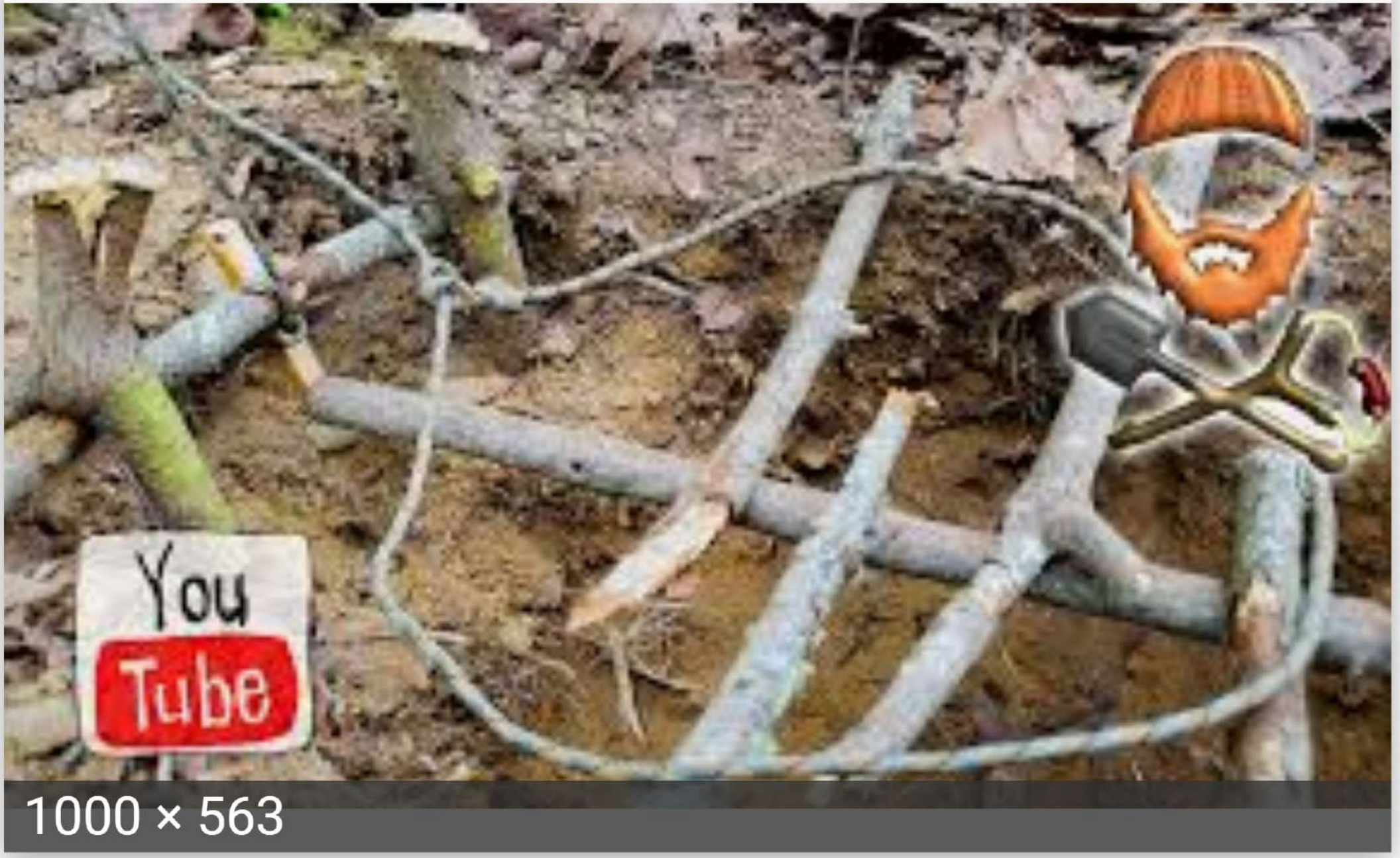
Front View



Top View

Bait Stick





1000 × 563

Paracord Snare Survival traps Episode 1 ...

Building a Figure 4 Deadfall - CleverSurvivalist.com

A: Fulcrum Stick should be tall enough to hold weight high enough to kill animal and strong enough to hold the weight of the weight.

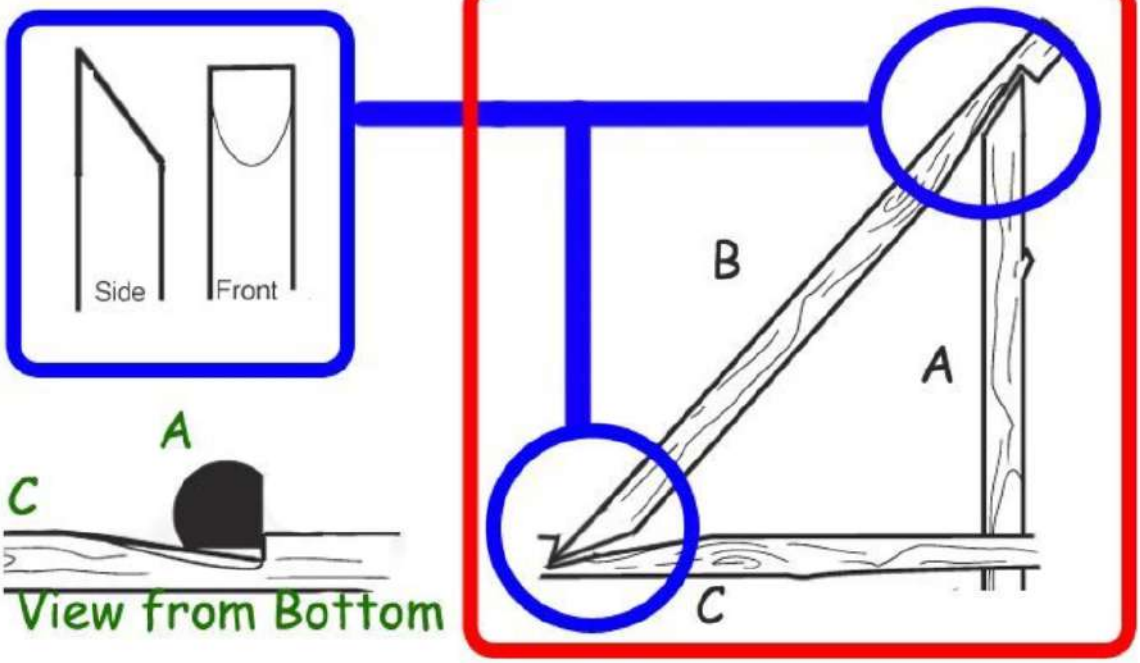
B: Weight Stick about same size of Fulcrum

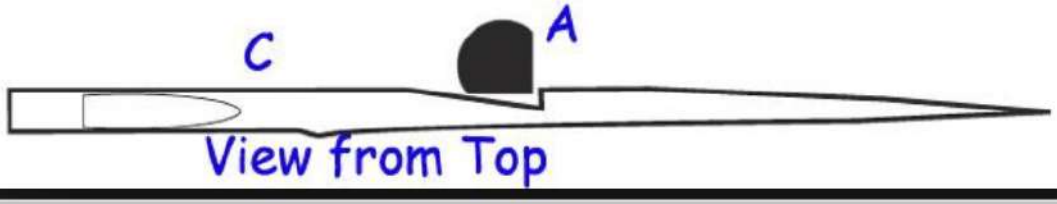
C: Bait Stick will be longer and will be sharpened on the tip to hold the bait on it.

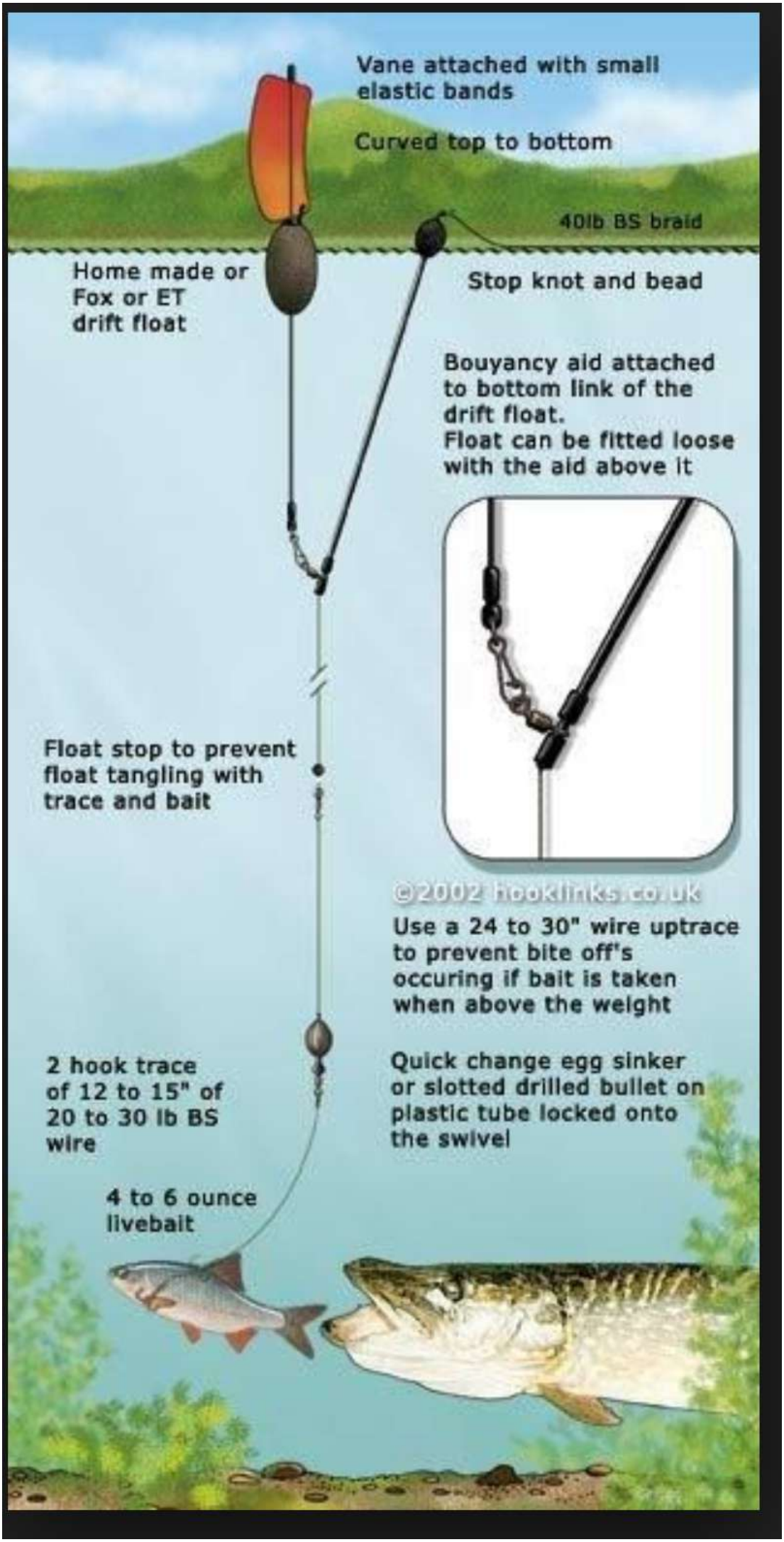
D: Deadfall is a log, rock, or other weight or a cage that is meant for live capture. You will obviously make everything sized for the game, you won't be getting Elk with it.

E: You want to find a flat hard surface to place the bottom of the Fulcrum on.

G: Visit CleverSurvivalist.com for more awesome posts!






Vane attached with small elastic bands
Curved top to bottom
40lb BS braid
Home made or Fox or ET drift float
Stop knot and bead
Bouyancy aid attached to bottom link of the drift float.
Float can be fitted loose with the aid above it
Float stop to prevent float tangling with trace and bait
©2002 hooklinks.co.uk
Use a 24 to 30" wire uptrace to prevent bite off's occuring if bait is taken when above the weight
2 hook trace of 12 to 15" of 20 to 30 lb BS wire
Quick change egg sinker or slotted drilled bullet on plastic tube locked onto the swivel
4 to 6 ounce livebait

Believe This Fishing? Unique Fish Trapping System | New Technique Of Catching Village Fish


1:12 / 7:46


DRIED MUD BLOCK
1:21 / 7:46


2:02 / 7:46


2:32 / 7:46


OPEN MESHBAG WITH BAIT
2:43 / 7:46


2:51 / 7:46
HD


2:54 / 7:46
HD


30 minutes later
3:03 / 7:46


4:06 / 7:46
HD


AroundMeBD
1:11 / 11:12
SUBSCRIBE FOR UPDATES


SUBSCRIBE FOR UPDATES
AroundMeBD
1:47 / 11:12
HD


AroundMeBD
SUBSCRIBE FOR UPDATES
5:17 / 11:12
HD


SUBSCRIBE
FOR
UPDATES
9:11 / 11:12


DANGER!
SURVIVAL
TRAP
TWISTED CORDAGE


Subscribe
0:45 / 1:06


0:56 / 12:18
HD


5:49 / 12:18
HD


6:27 / 12:18


32kg
9:09 / 12:18


8:57 / 12:18
CC
HD


9:37 / 12:18


9:48 / 12:18
HD


9:58 / 12:18


10:13 / 12:18
CC
HD


Large steel tip
11:27 / 12:18

Distillation Set-up

1

Begin with a round bottom flask. This is one of the most critical pieces of glassware in the assembly, since it will hold the liquid to be distilled. You don't want it to fall and break because you would (1) lose your compound (2) spill a possible hazardous chemical.

Round bottom flasks are part of your drawer equipment. It will be held in place in the set-up with a small three-pronged clamp with holder which is also in your lab drawer. Grab two ring stands from the back shelves. Obtain a ring clamp (in a box on the back shelves) and two ring stands (back shelves). The ring clamp will hold the heat source, either a steam bath or a heating mantle.

Distillation Set-up

2

Place a ring clamp and your three pronged clamp on the ring stand. The ring clamp goes on the bottom and will hold the heat source, either a steam bath or a heating mantle.

Secure the round bottom flask to the ring stand using the three pronged clamp.

The next item to be added is the Y-adaptor, which is in your lab drawer.

Distillation Set-up

3

The Y-adaptor sits on top of the roundbottom flask. Simply place it on top.

The next item to be added, the condensor, will secure the Y-adaptor to the system. You will also need a yellow clip and a versatile clamp. All of these items are in your lab drawer.

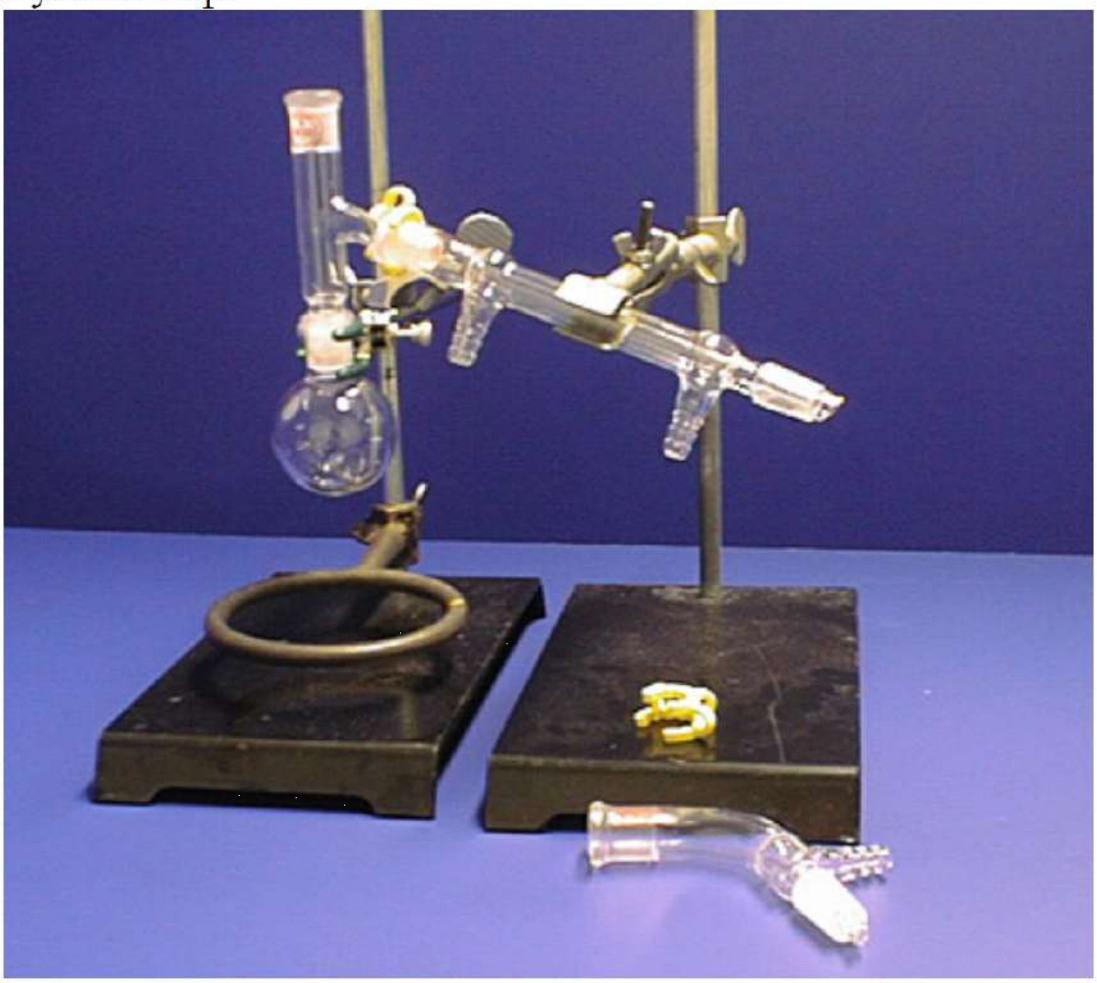
Navigation:

Distillation Set-up

4

Connect the condensor to the Y-adaptor and secure the connection with a yellow clip. Secure the condensor to the ring stand with a versatile clamp.

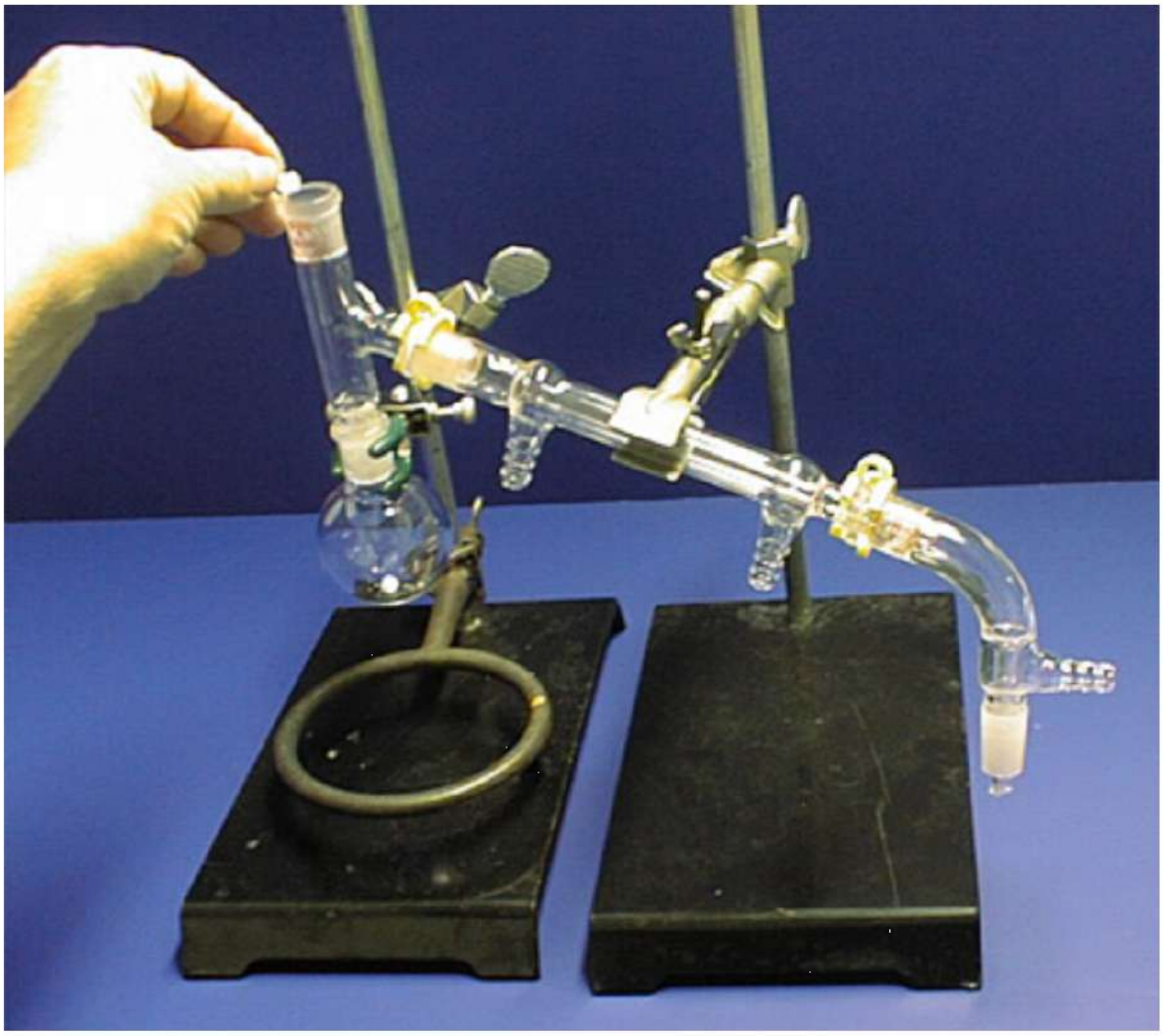
The next items you will need from your lab drawer are a vacuum adaptor and a yellow clip.



Distillation Set-up

5

Connect the vacuum adaptor to the condensor and secure the connection with a yellow clip. Add a couple boiling chips to the round bottom flask by dropping them down the Y-adaptor.

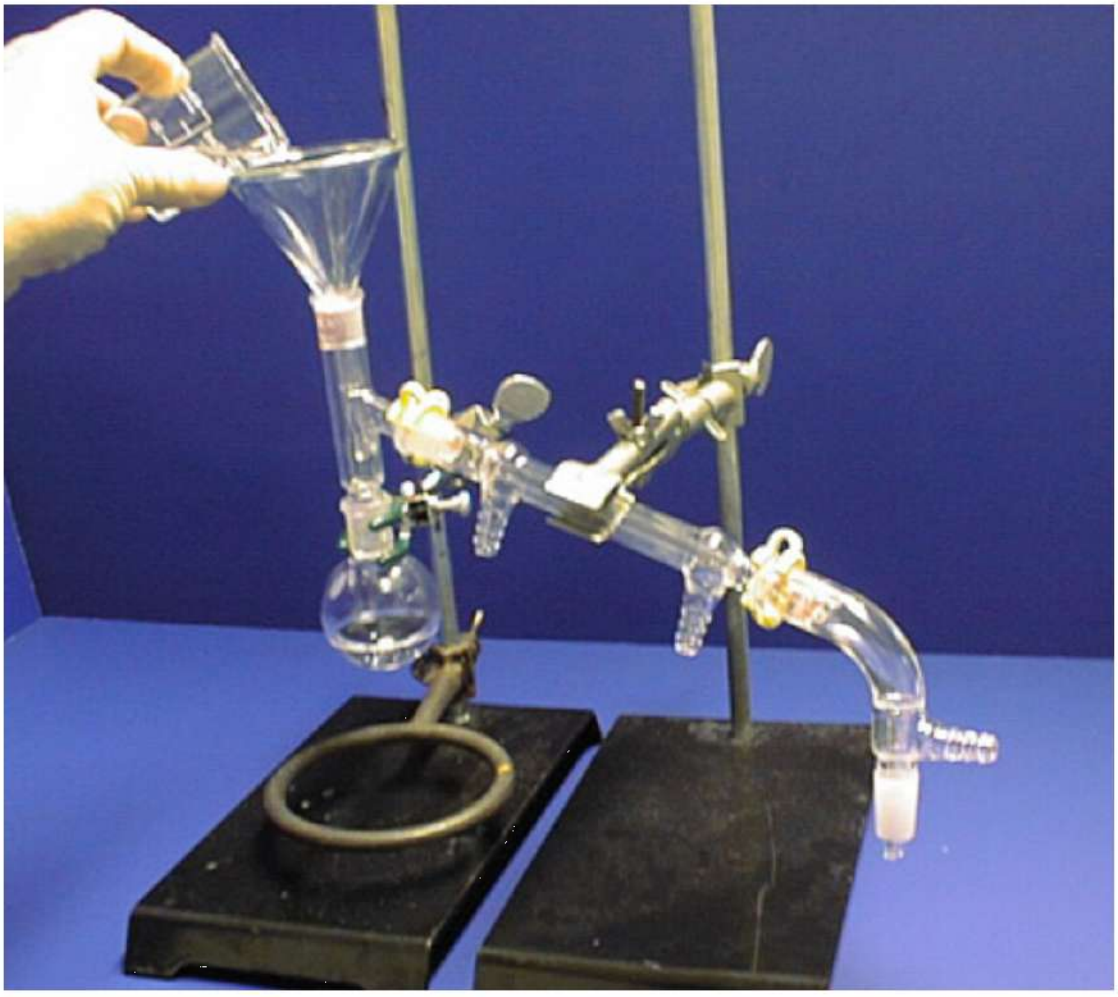


Distillation Set-up

6

Place a stemmed funnel into the top of the Y-adaptor and pour the liquid to be distilled through it so that it goes into the round bottom flask. The flask should be from 1/2 to 2/3 full, no more, no less (see details).

When done, remove the funnel.

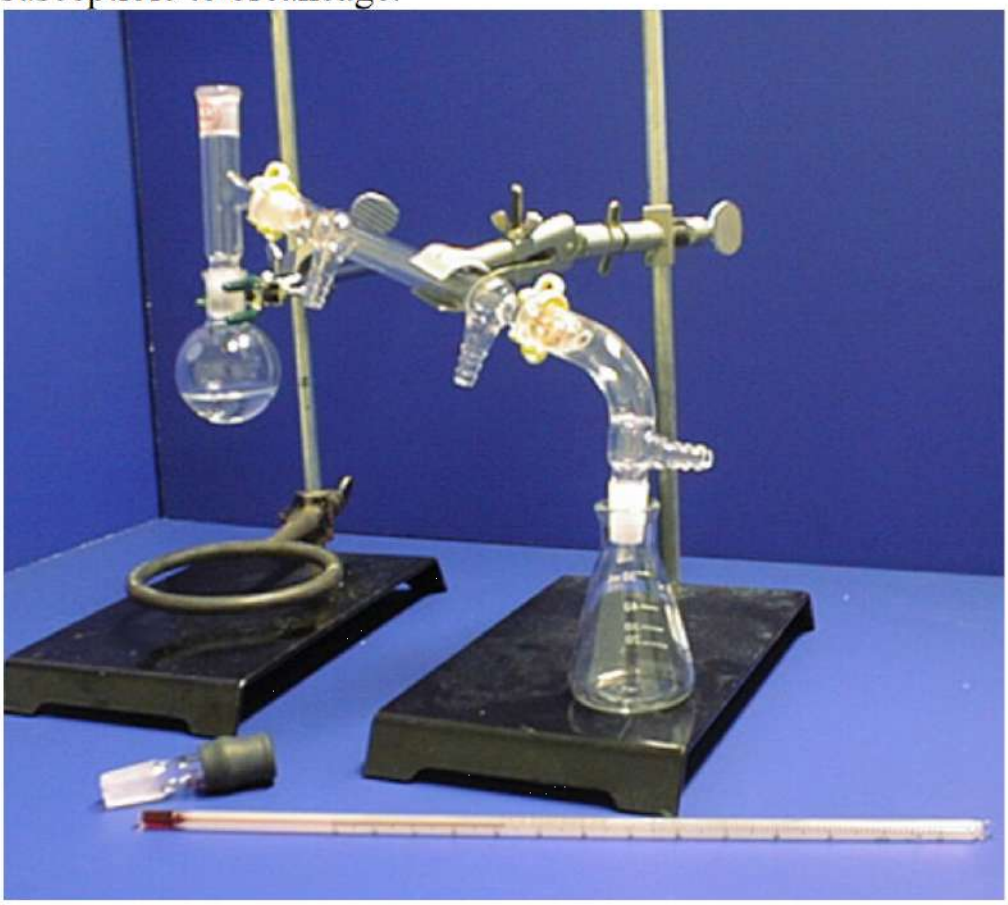


Distillation Set-up

7

This picture is only different from the last in that a flask has been placed under the vacuum adaptor. This is the "receiving flask". A beaker or vial or graduated cylinder could also be used. In a vacuum distillation, a round bottom flask is used as the receiving flask, and it is securely attached with either a clamp or a yellow clip.

The next items to be added are the thermometer adaptor and thermometer. The thermometer is always added last because it is large and susceptible to breakeage.



Distillation Set-up

8

Here is all the glassware properly assembled. The thermometer and thermometer adaptor are connected on top of the Y-adaptor. Go to the following link for a close-up view of the position of the thermometer in the Y-adaptor.

- thermometer in Y-adaptor

Oops, what's missing? the receiving flask. I purposely removed it in preparation for the addition of the steam bath and tubing. The addition of these items could cause an un-secured flask to fall and break.

Clip the text link below to see the set-up showing the entire length of the thermometer, no other changes. Skip it if you like.

- full view

Distillation Set-up

9

Look in your drawer or on the bench for your steam bath. Grab 4 lengths of Tygon tubing from either your drawer or the box in the back of the lab.

Distillation Set-up

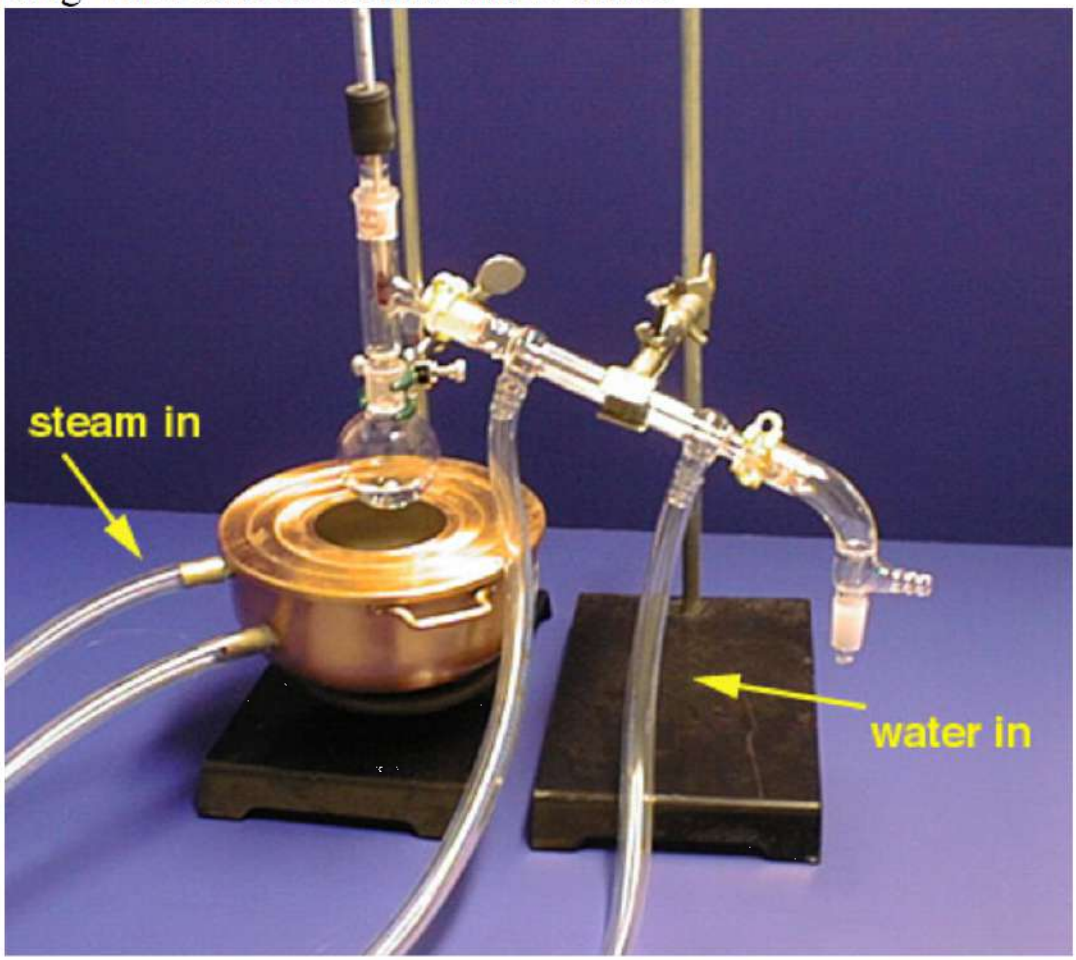
10

Place the steam bath on the ring under the round bottom flask. Adjust the height of the steam bath and/or apparatus as necessary.

Connect two pieces of Tygon tubing to the condenser: one to each connection of the water-jacket of the condensor. The tubing to the lower connection goes to the water source, the upper connection goes to the drain.

Connect two pieces of Tygon tubing to the steam bath: one to the lower and one to the upper connection. The tubing at the upper connection goes to the steam source, the lower one goes to the drain.

Make sure all of the glass and tubing joints are tight before turning on the cooling water and the steam. You're done!



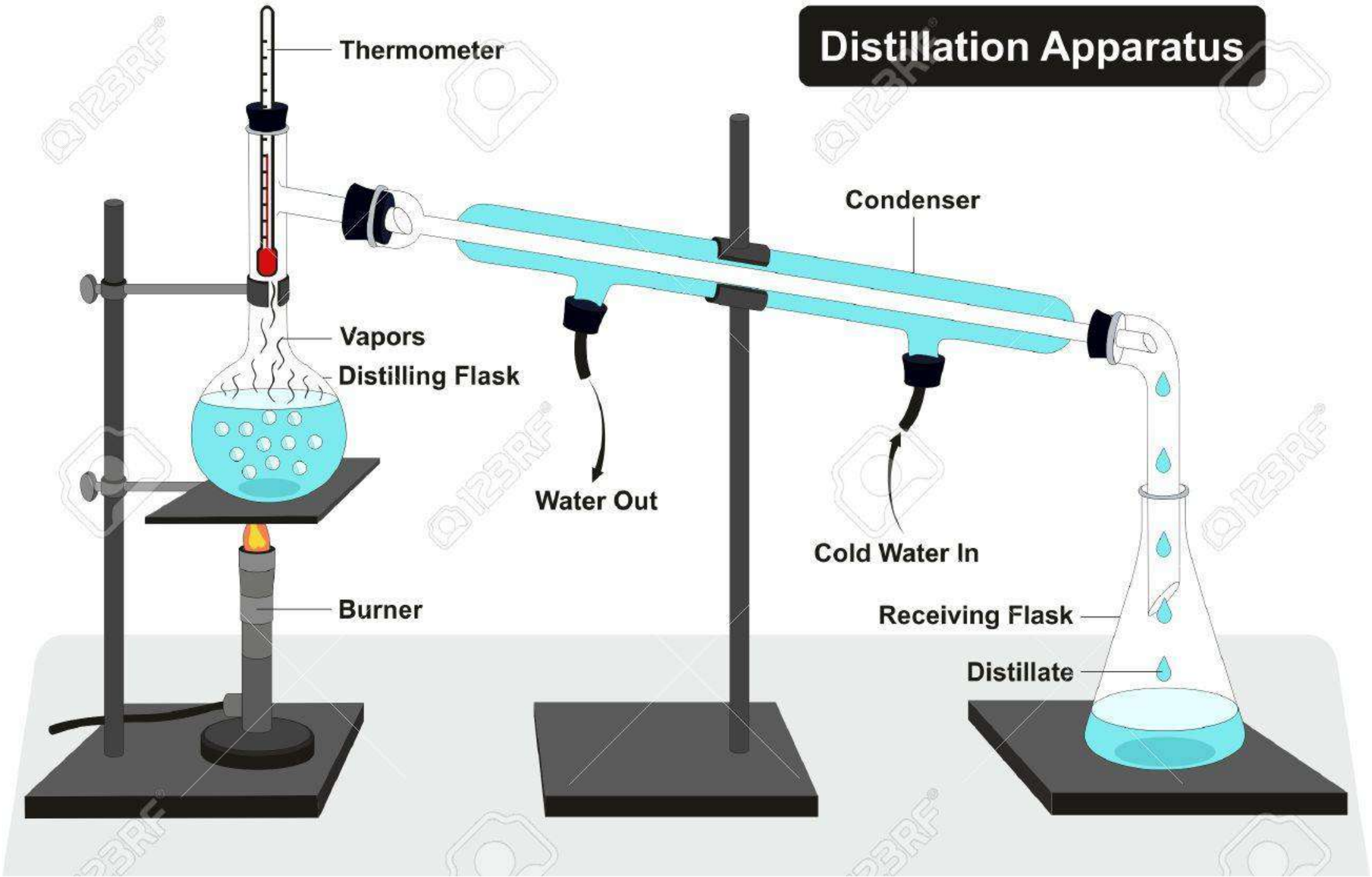
Distillation Set-up

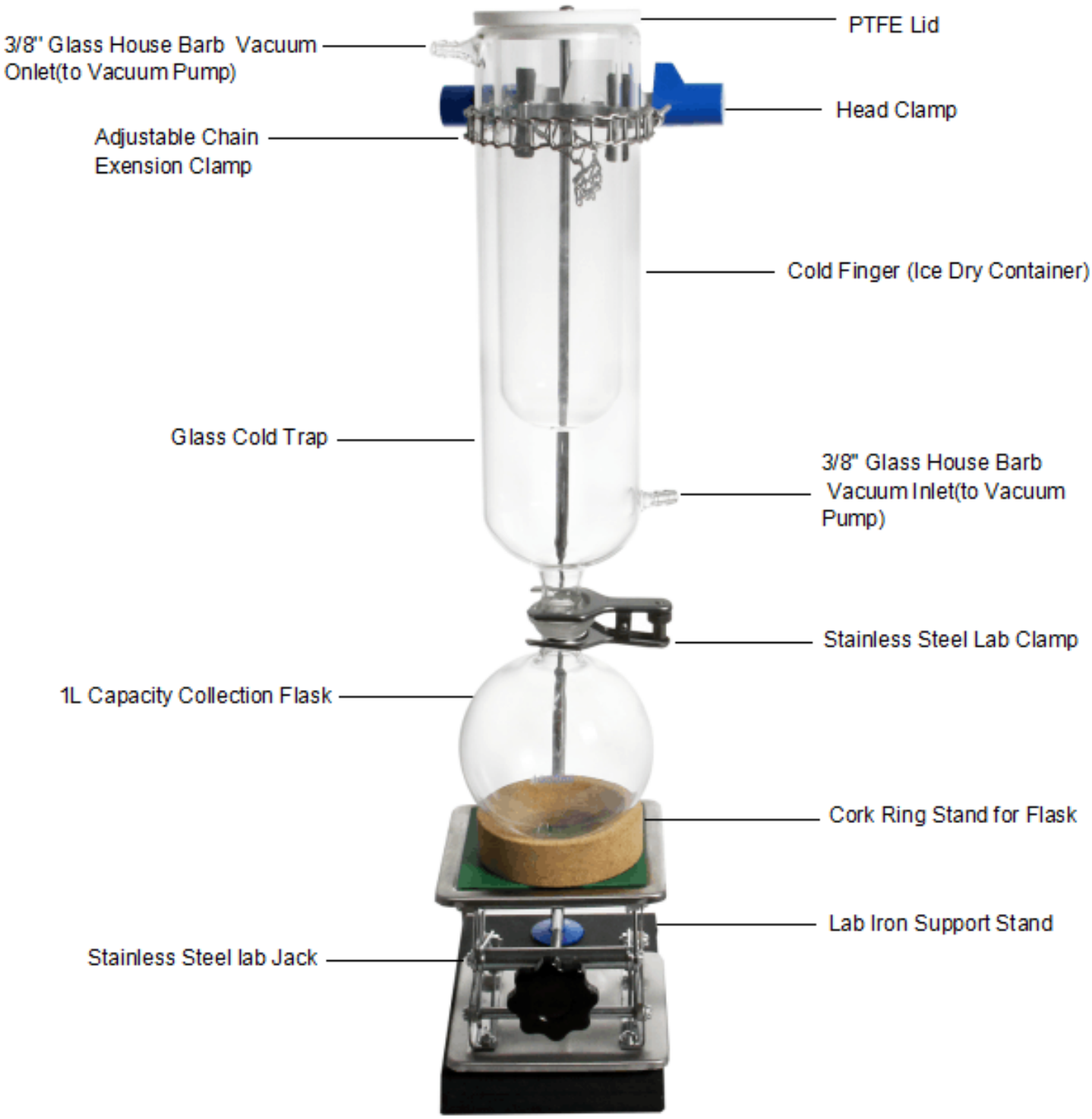
completed!

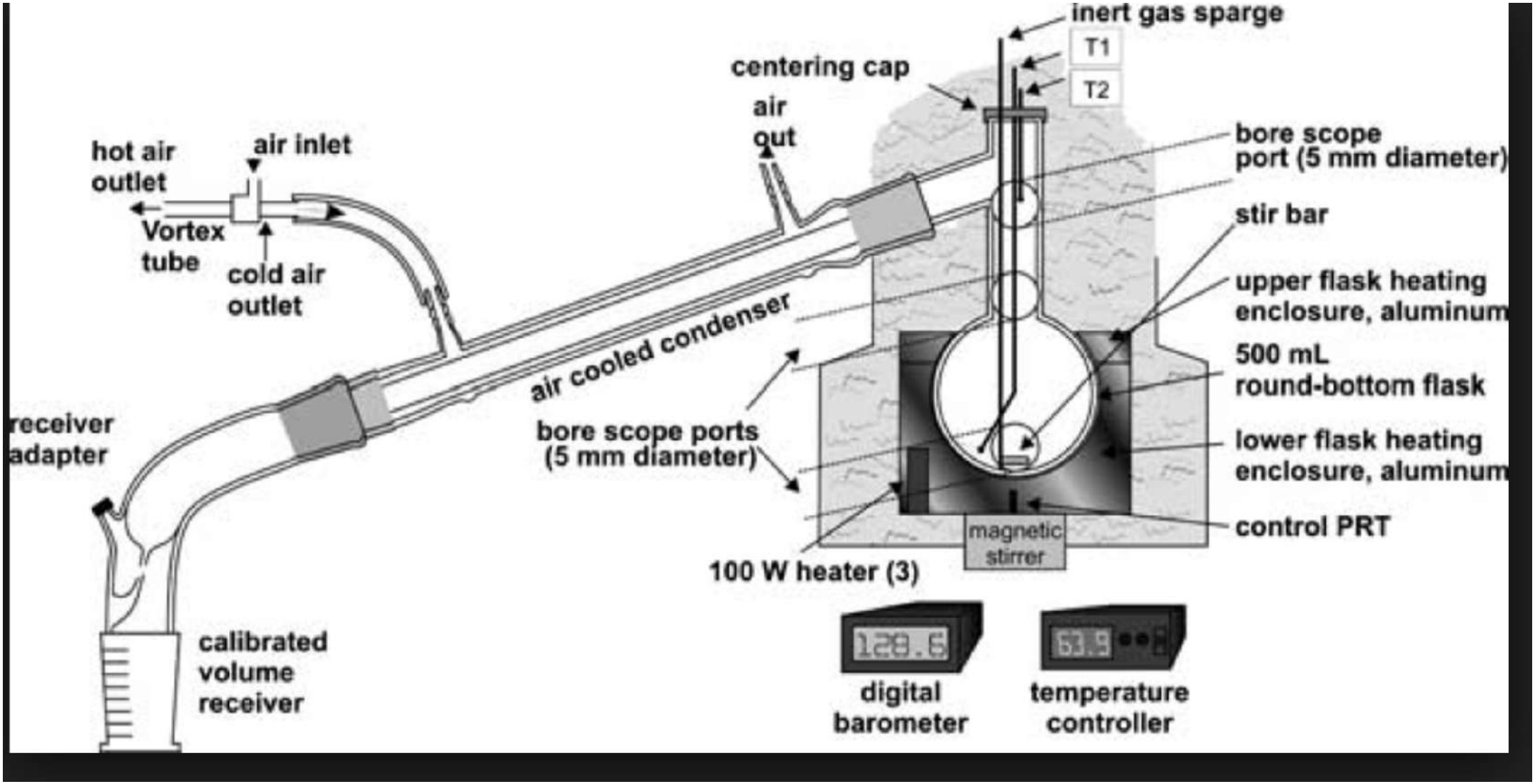
This is the entire set-up, ready to begin distillation.


LABCONCO
LABCONCO
FLAMMABLE

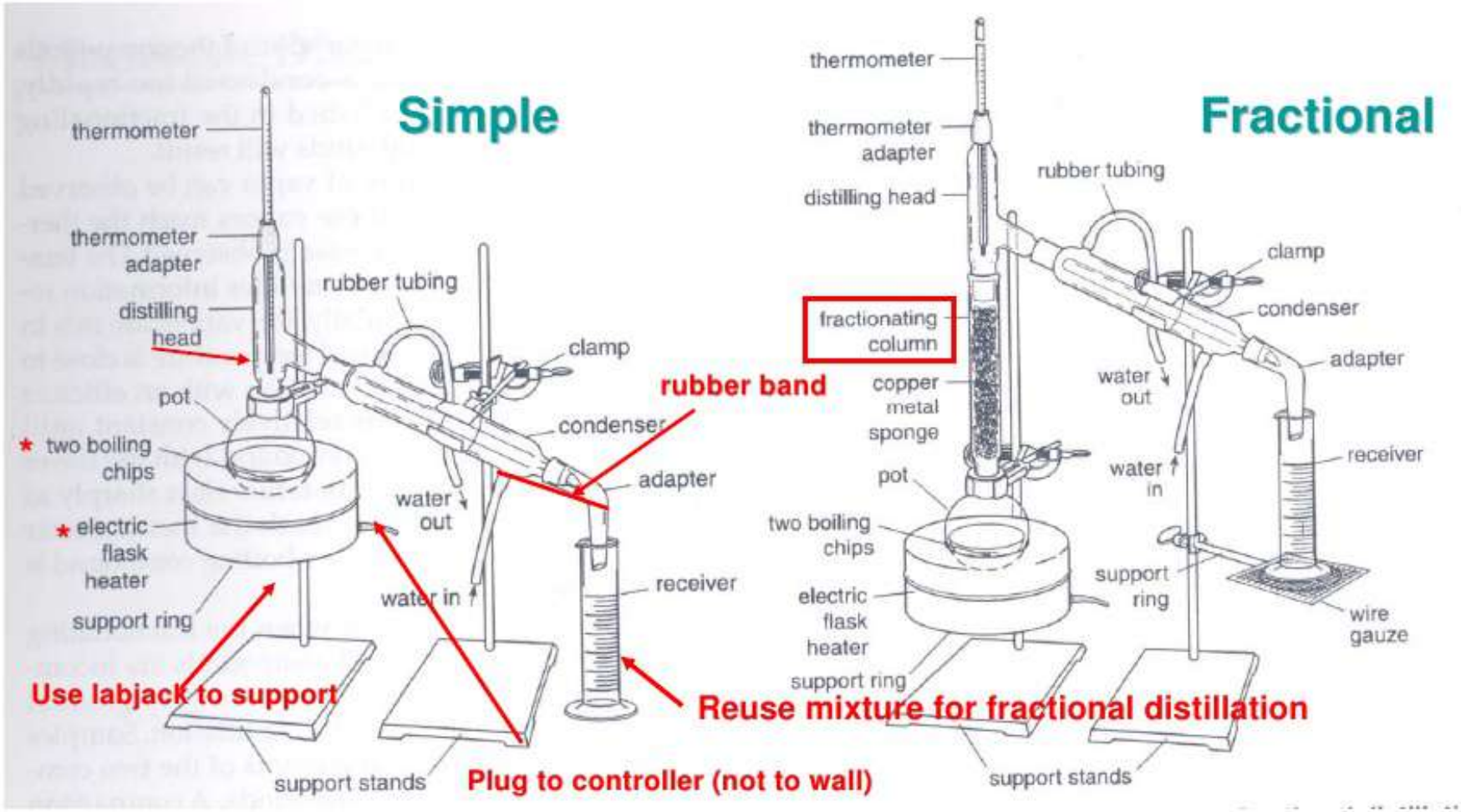
科瑞仪器
kori instrument

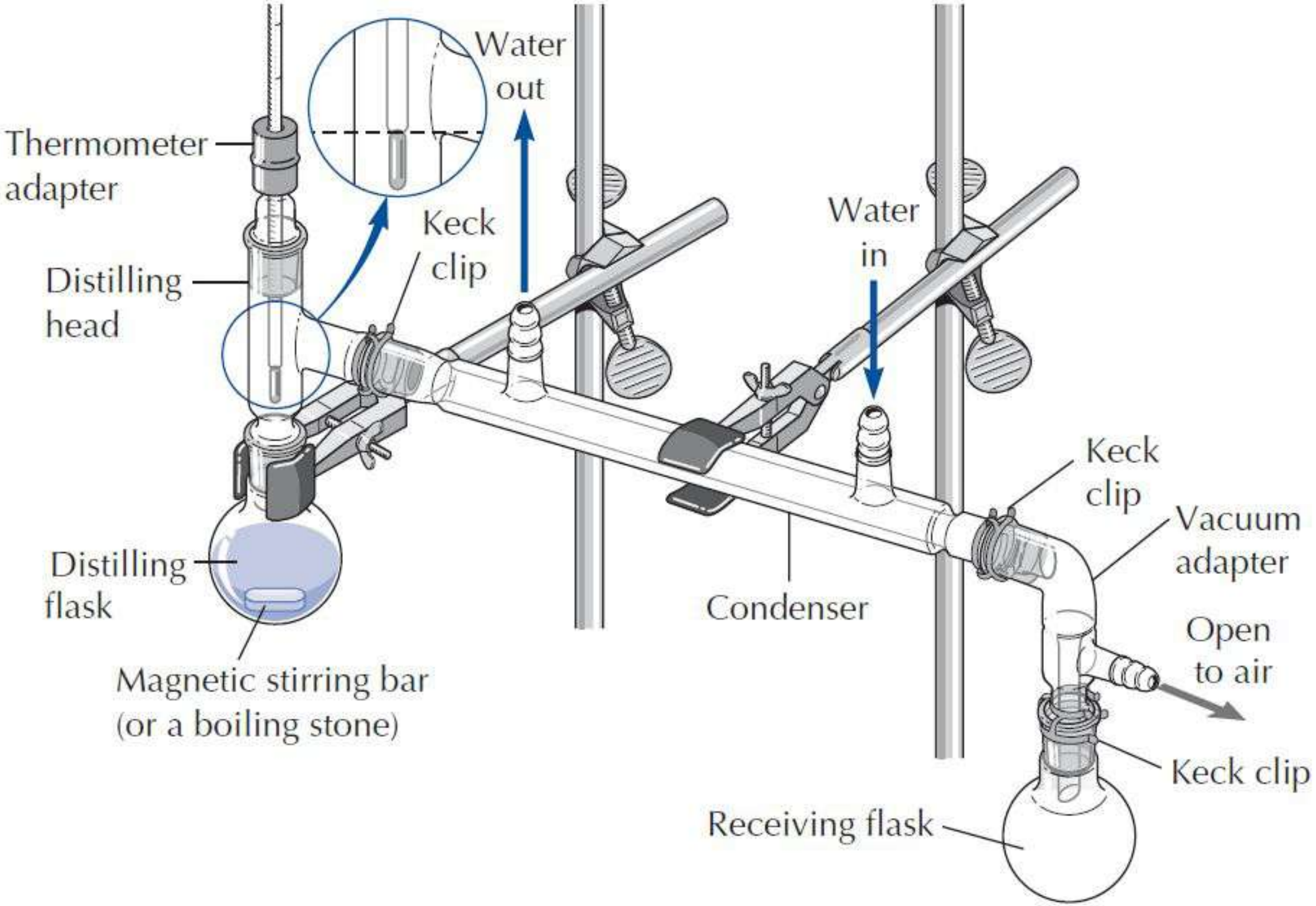

Distillation Apparatus
Thermometer
Condenser
Vapors
Distilling Flask
Water Out
Cold Water In
Burner
Receiving Flask
Distillate

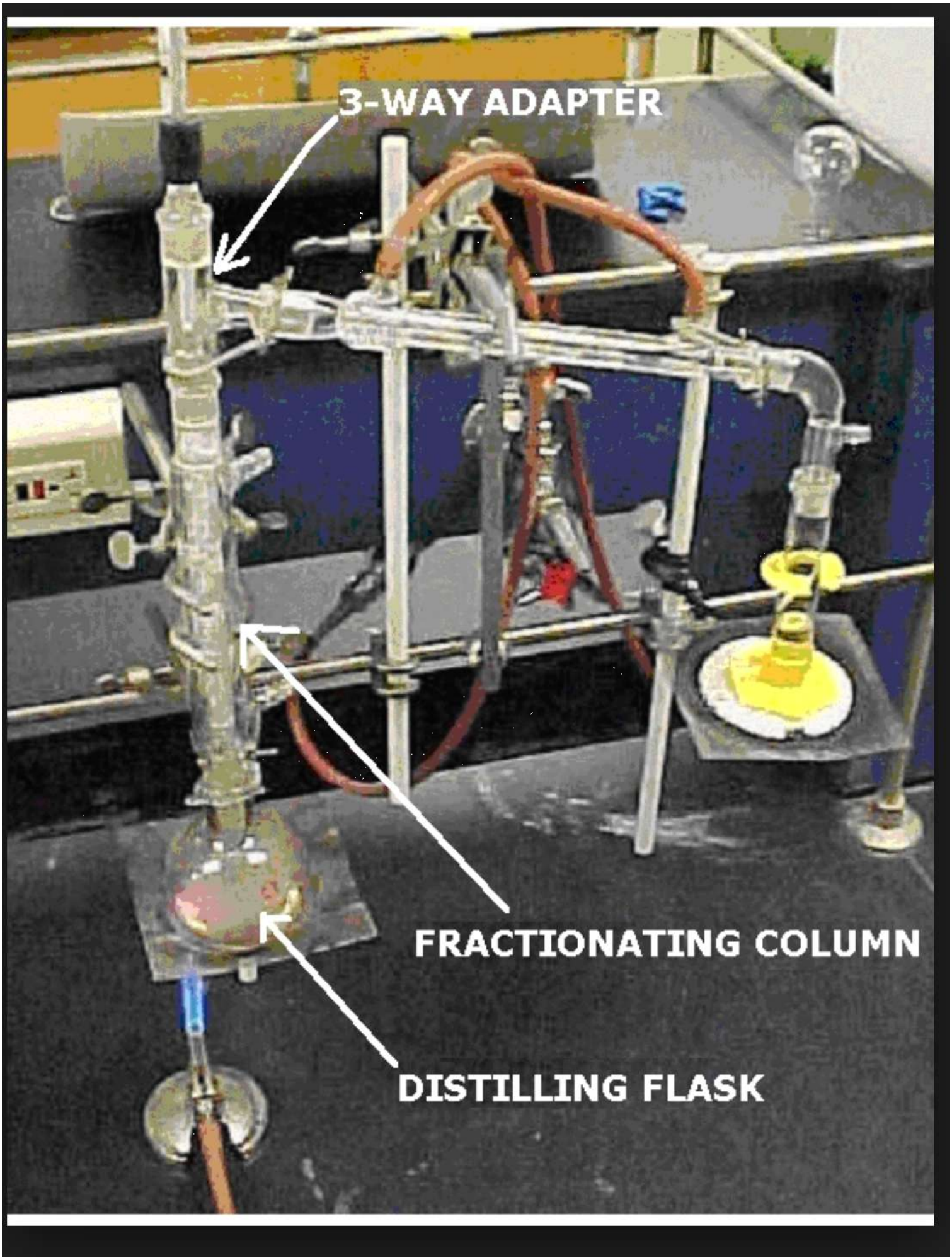

PTFE Lid
3/8" Glass House Barb Vacuum Onlet(to Vacuum Pump)
Head Clamp
Adjustable Chain Exension Clamp
Cold Finger (Ice Dry Container)
Glass Cold Trap
3/8" Glass House Barb Vacuum Inlet(to Vacuum Pump)
Stainless Steel Lab Clamp
1L Capacity Collection Flask
Cork Ring Stand for Flask
Lab Iron Support Stand
Stainless Steel lab Jack

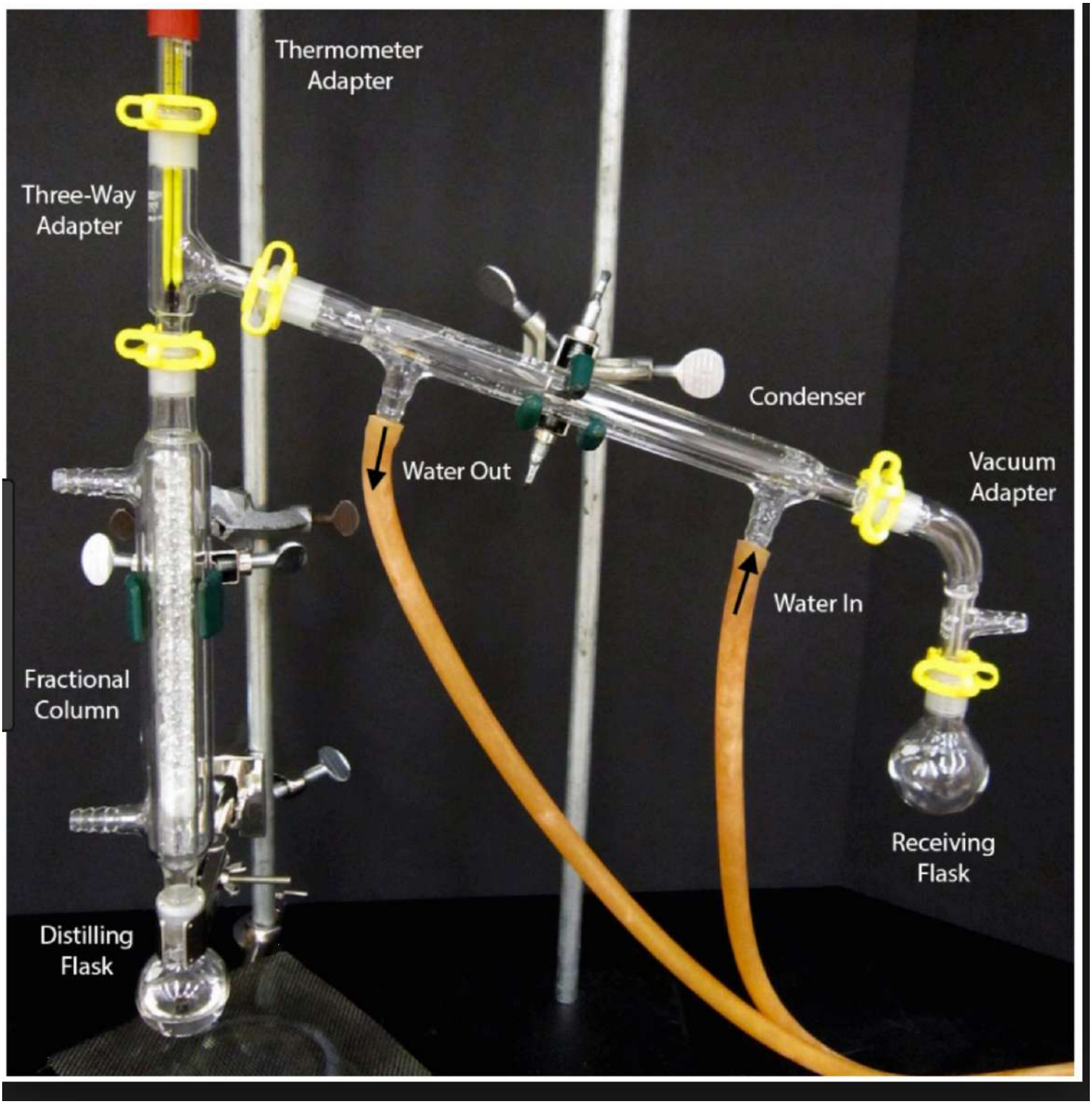

inert gas sparge
T1
T2
centering cap
air
out
hot air
outlet
air inlet
Vortex
tube
cold air
outlet
bore scope
port (5 mm diameter)
stir bar
upper flask heating
enclosure, aluminum
air cooled condenser
500 mL
round-bottom flask
receiver
adapter
bore scope ports
(5 mm diameter)
lower flask heating
enclosure, aluminum
magnetic
stirrer
control PRT
100 W heater (3)
calibrated
volume
receiver
digital
barometer
temperature
controller

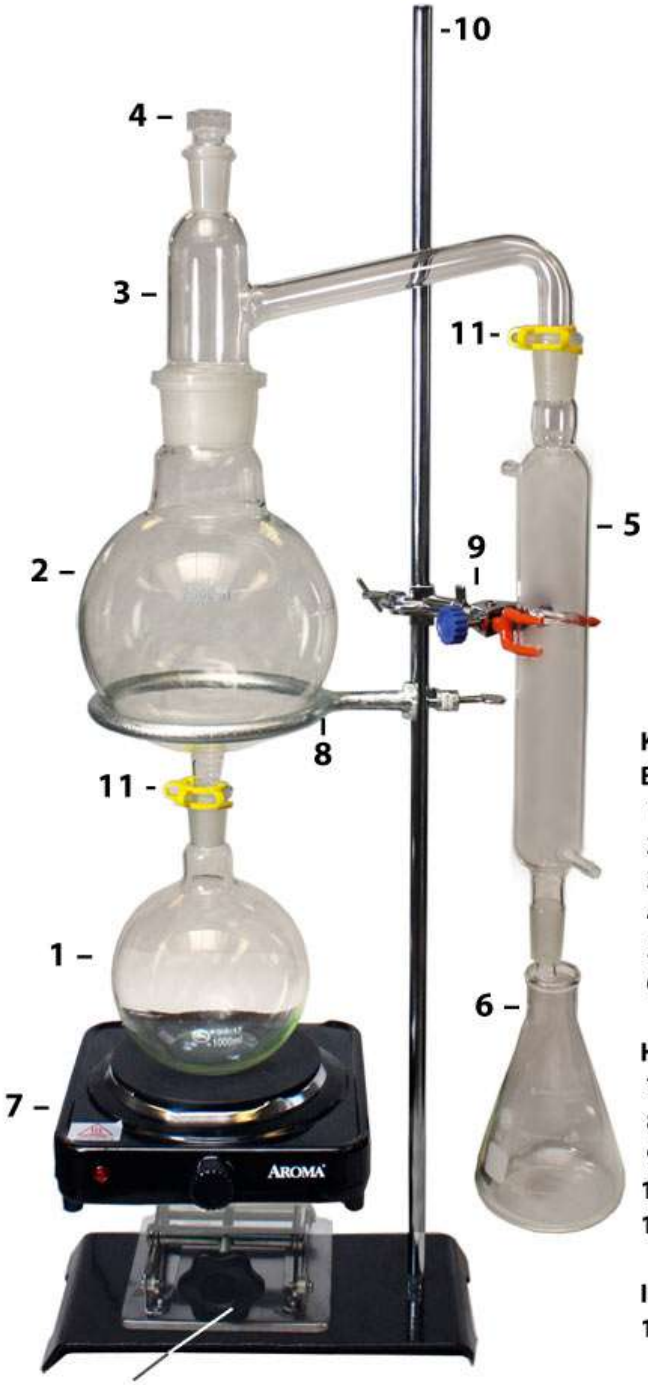
Distillation Setups




Water out
Thermometer adapter
Keck clip
Distilling head
Water in
Keck clip
Vacuum adapter
Distilling flask
Condenser
Open to air
Magnetic stirring bar (or a boiling stone)
Keck clip
Receiving flask


3-WAY ADAPTER
FRACTIONATING COLUMN
DISTILLING FLASK


Thermometer Adapter
Three-Way Adapter
Condenser
Water Out
Vacuum Adapter
Water In
Fractional Column
Receiving Flask
Distilling Flask

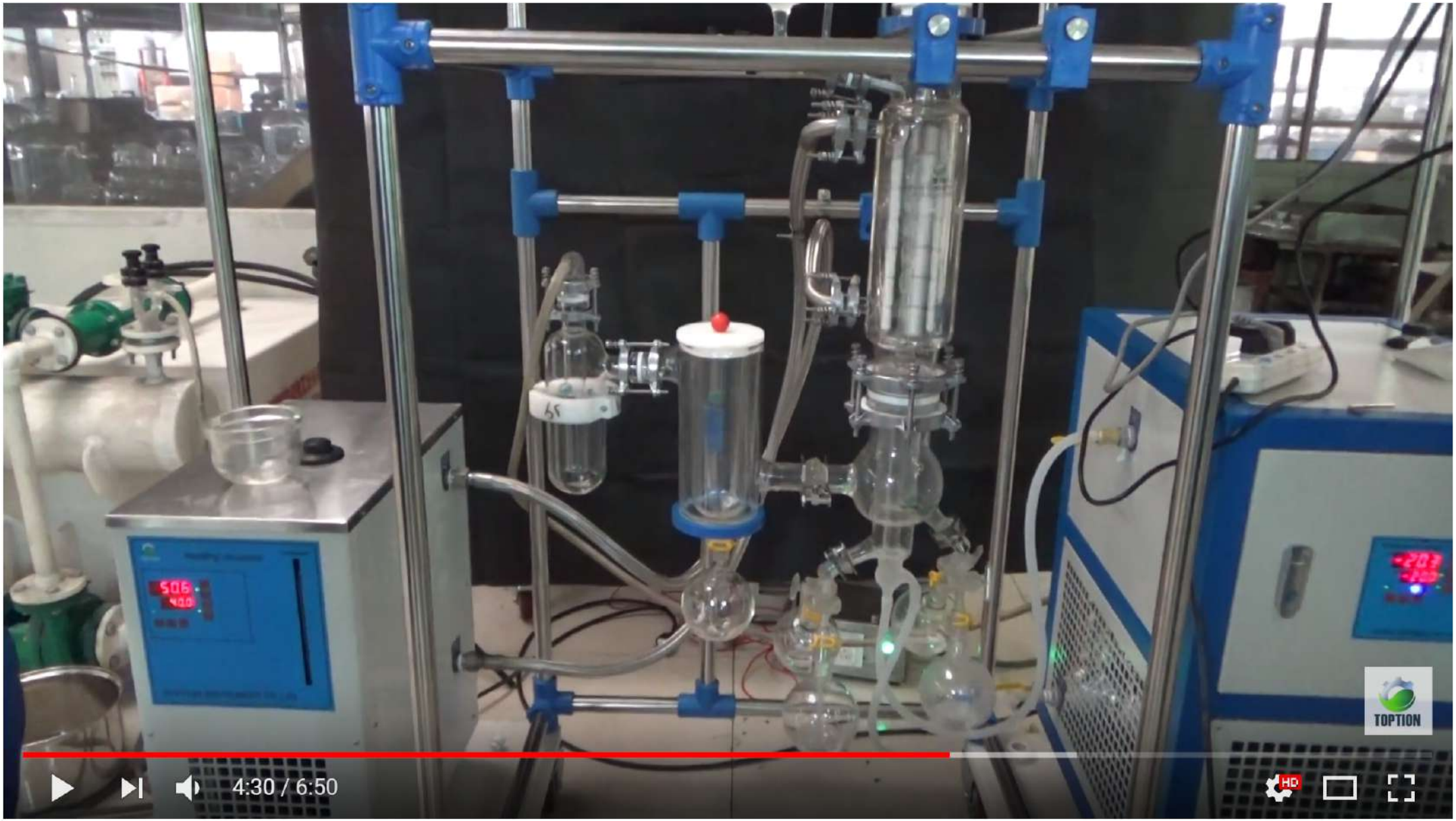


Optional Lab Scissors Jack
(Order Part No. NC-13222)

KIT CONTAINS...
Borosilicate Glassware:
1. Boiling Flask, 1L
2. Biomass Flask, 2L.
3. Distillation Arm.
4. Glass Stopper.
5. Condenser, 300mm.
6. Erlenmeyer Flask, 500mL.

Hardware:
7. Electric Hotplate.
8. Ring Clamp, 6".
9. 3-Finger Clamp.
10. Lab Support Stand.
11. Keck Clamps (2).

Included but not shown...
12. 5 ft. Amber Latex Tubing (2).



How To Install Molecular Distillation Apparatus?

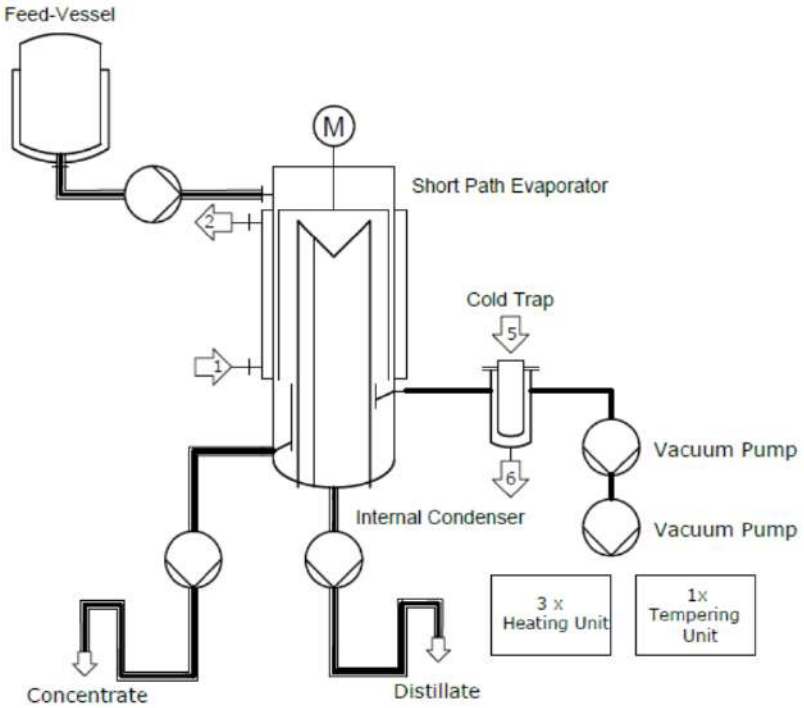
Solvent Vacuum Distillation

Root Sciences - Short Path Distillation of Cannabis & Hemp (THC/CBD)

Short Path Distillation Plant VKL 70-5

Root Sciences Short Path Distillation apparatus is a short path evaporator with an internal condenser and discharge arms for concentrate and distillate.

With short path distillation, a decrease of boiling temperature is obtained by reducing the operating pressure. It is a continuous process with very short residence time.



Advantages of Our System

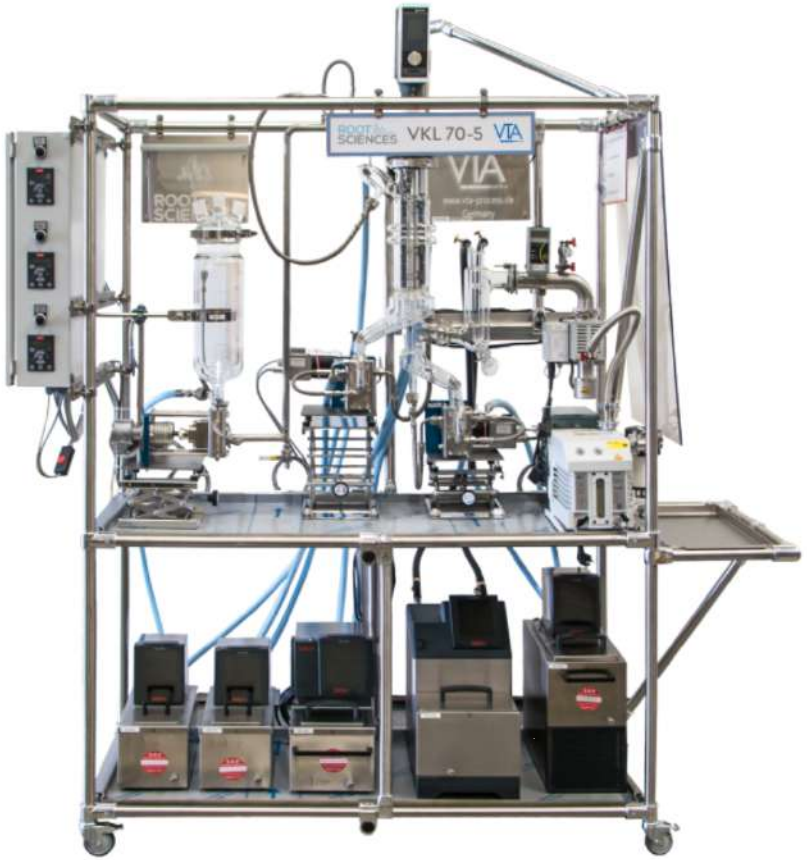
- Continuous feed
- Short residence time (less than 10 seconds)
- High evaporation rates

- Low processing temperatures
- Low vacuum (down to 0.001 mbar)

- Low fouling on evaporator wall
- Compact design

- Automated System
- Easy to use

- **Separates cannabis extracts into high concentrations of clear distillate.**



Cannabis Crude Oil Extraction, Ethanol Recovery and Decarboxylation

Coming Soon from the Global Leaders in Bio-Extraction Technology

Root Sciences & DEVEX

Root Sciences has led the industry in post-processing technology through its exclusive global relationship with German manufacturer, VTA.

Root Sciences is proud to announce our partnership with DEVEX, the global leader in Cryo Ethanol Extraction Equipment.

Coming soon, Root Sciences and DEVEX will pave the way for cryo ethanol as a sustainable solution for pre-distillation crude cannabis oil.

DEVEX Verfahrenstechnik GmbH

Preliminary Key Features

- All in 1 Cryo-Extraction, solvent recovery, and Decarboxylation system
- Throughput: 400 lbs per 8-hour day

- Solvent Recovery Rate: 350L / hour and up
- Solvent Residual: Low residual solvent left in spent biomass by means of steam stripping

- Extraction temperature: -40 to -60 Degrees C
- No Need to De-wax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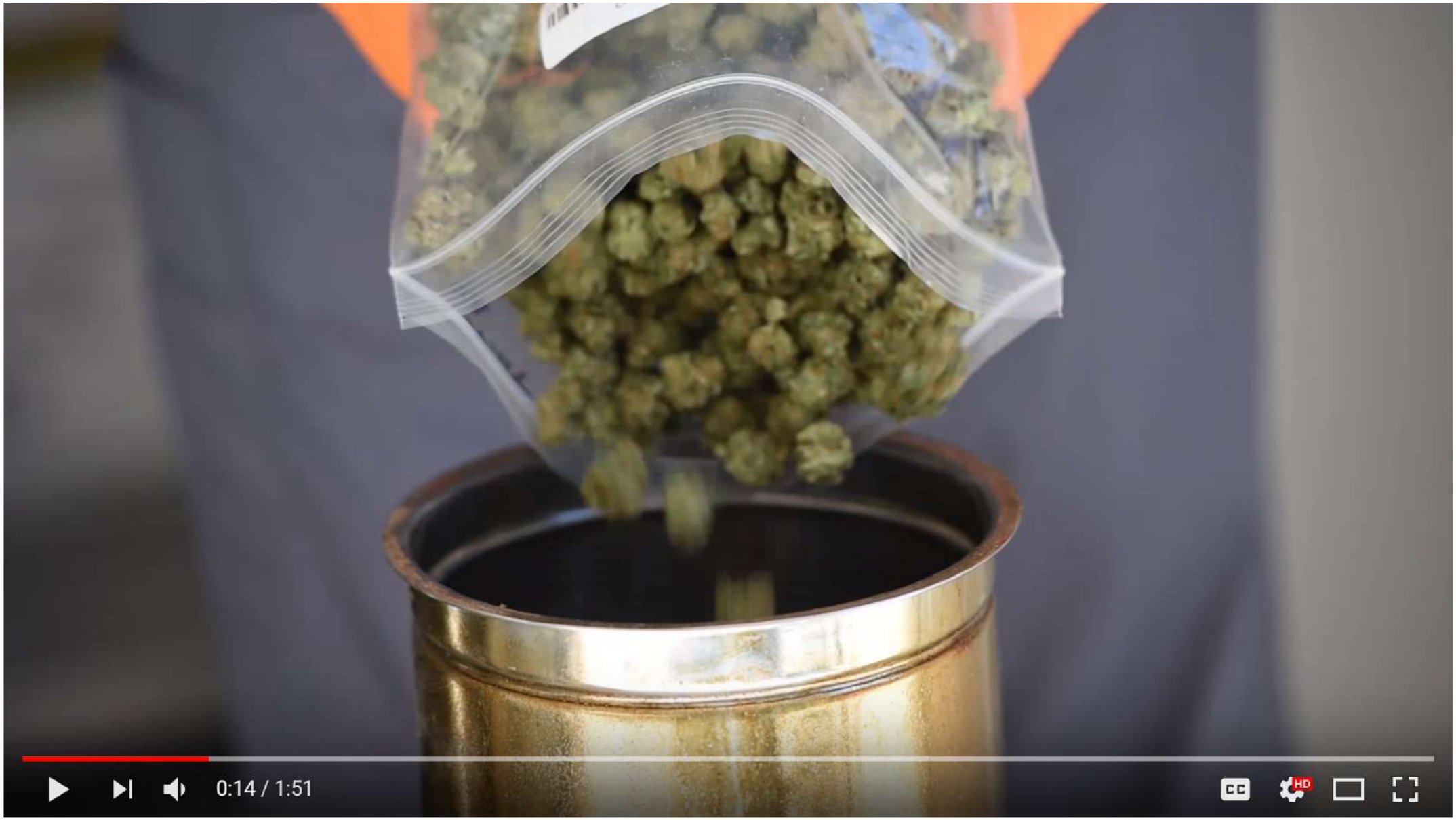
HD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LIQUID BUTANE / PROPANE MIX
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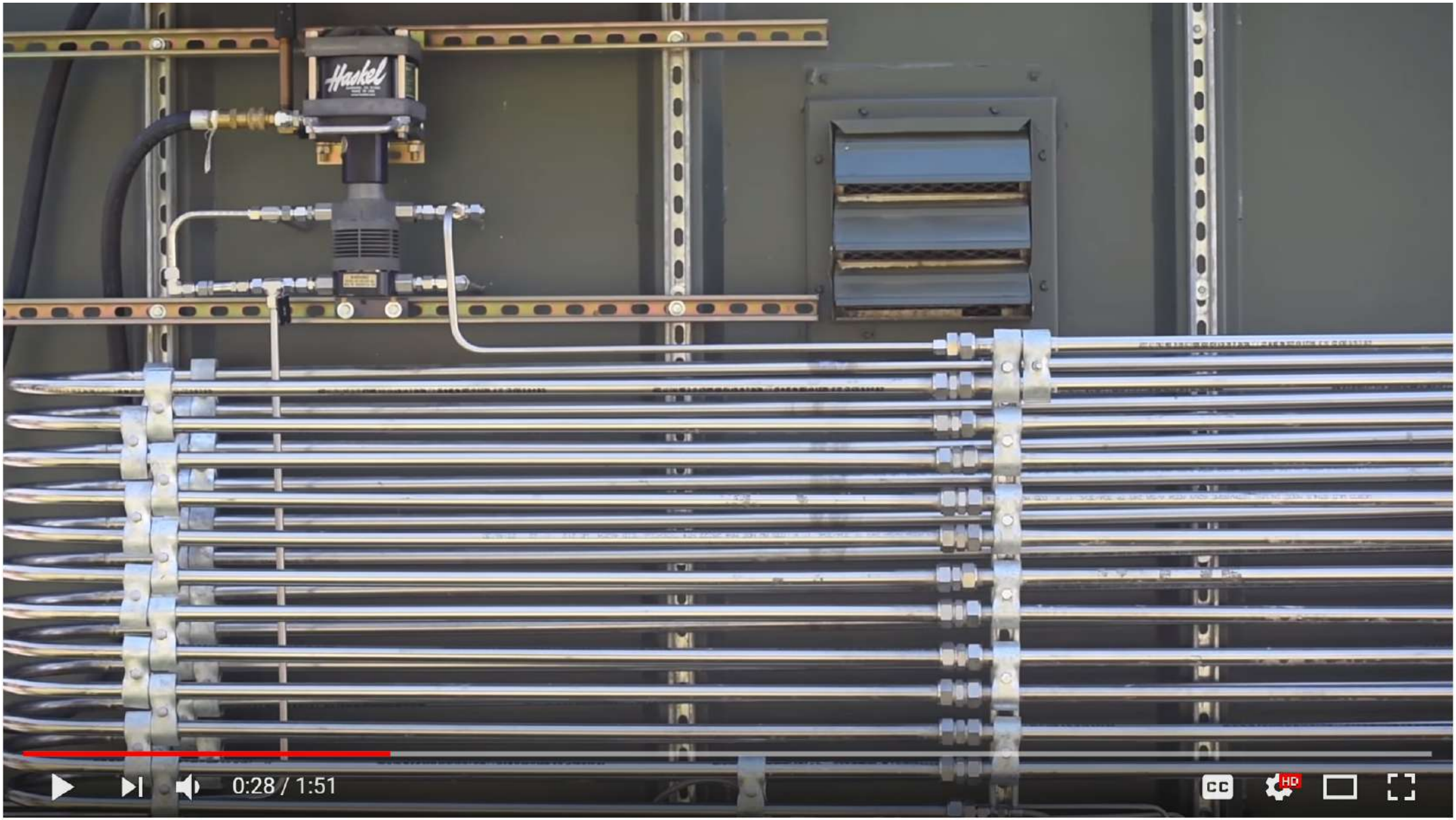
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5 DIFFERENT TEMPERATURE ZONES
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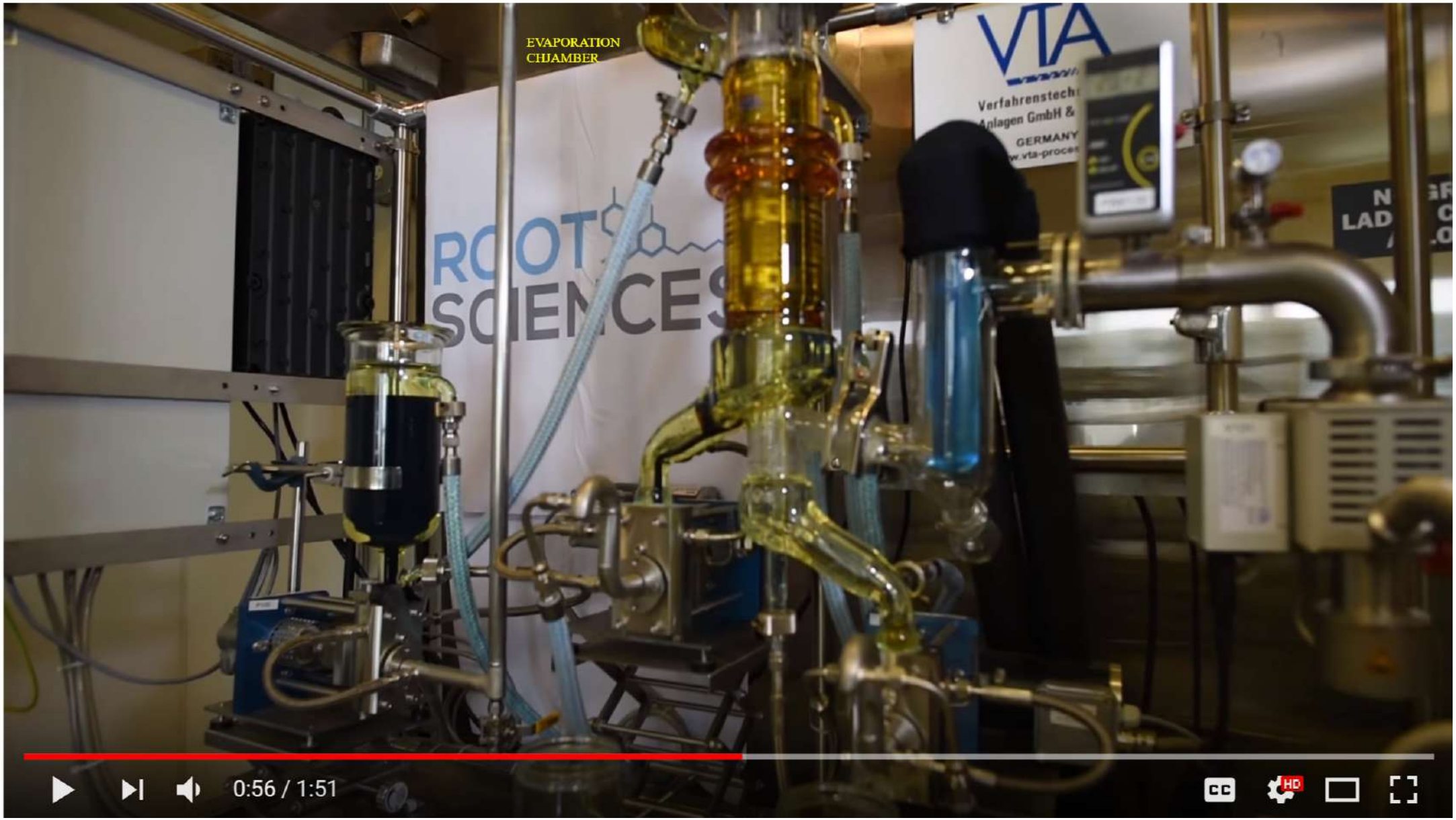
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HD

This is how I press rosin


2:54 / 4:47
CC
HD
True Buds TV

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26 Watching

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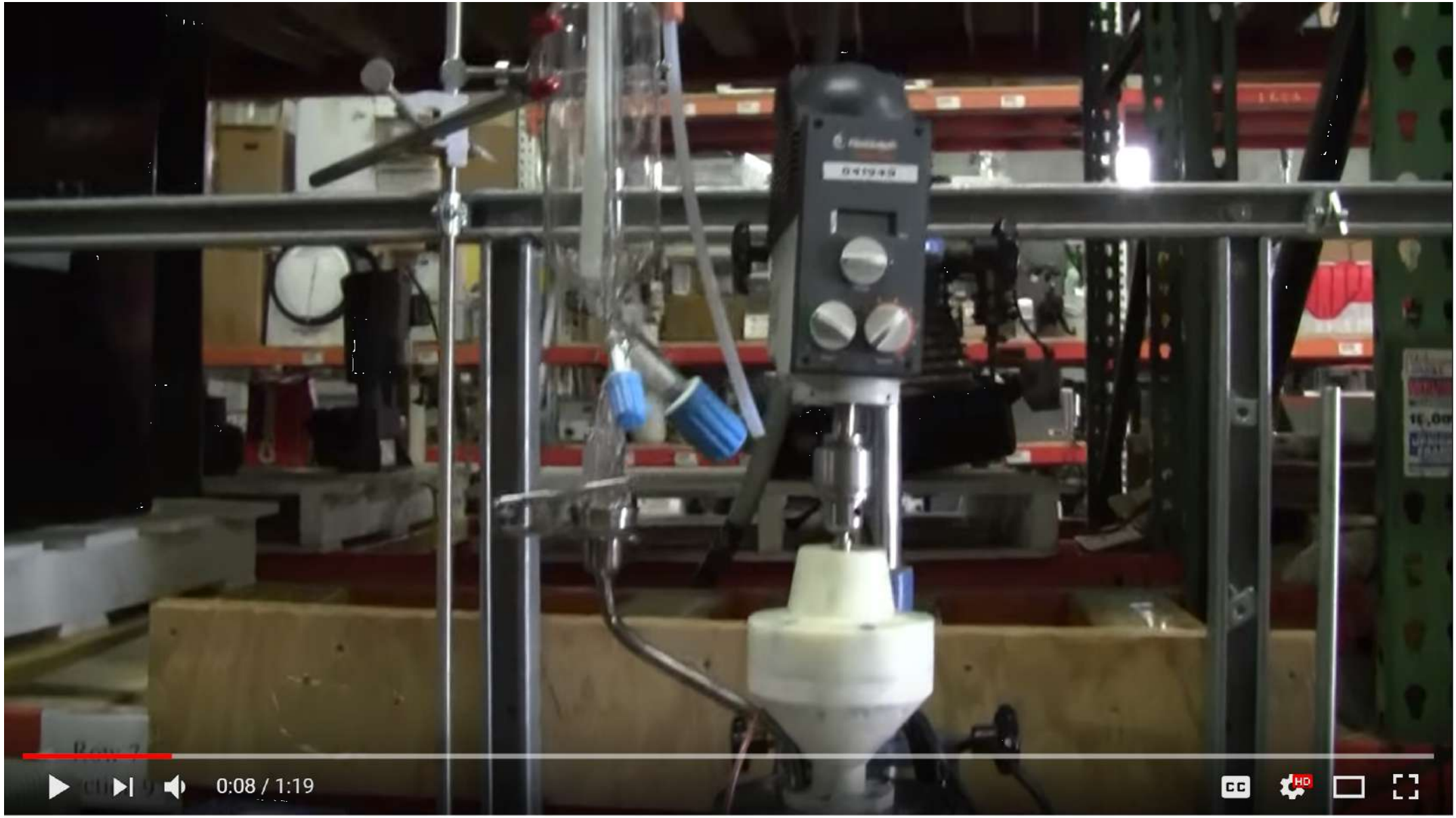
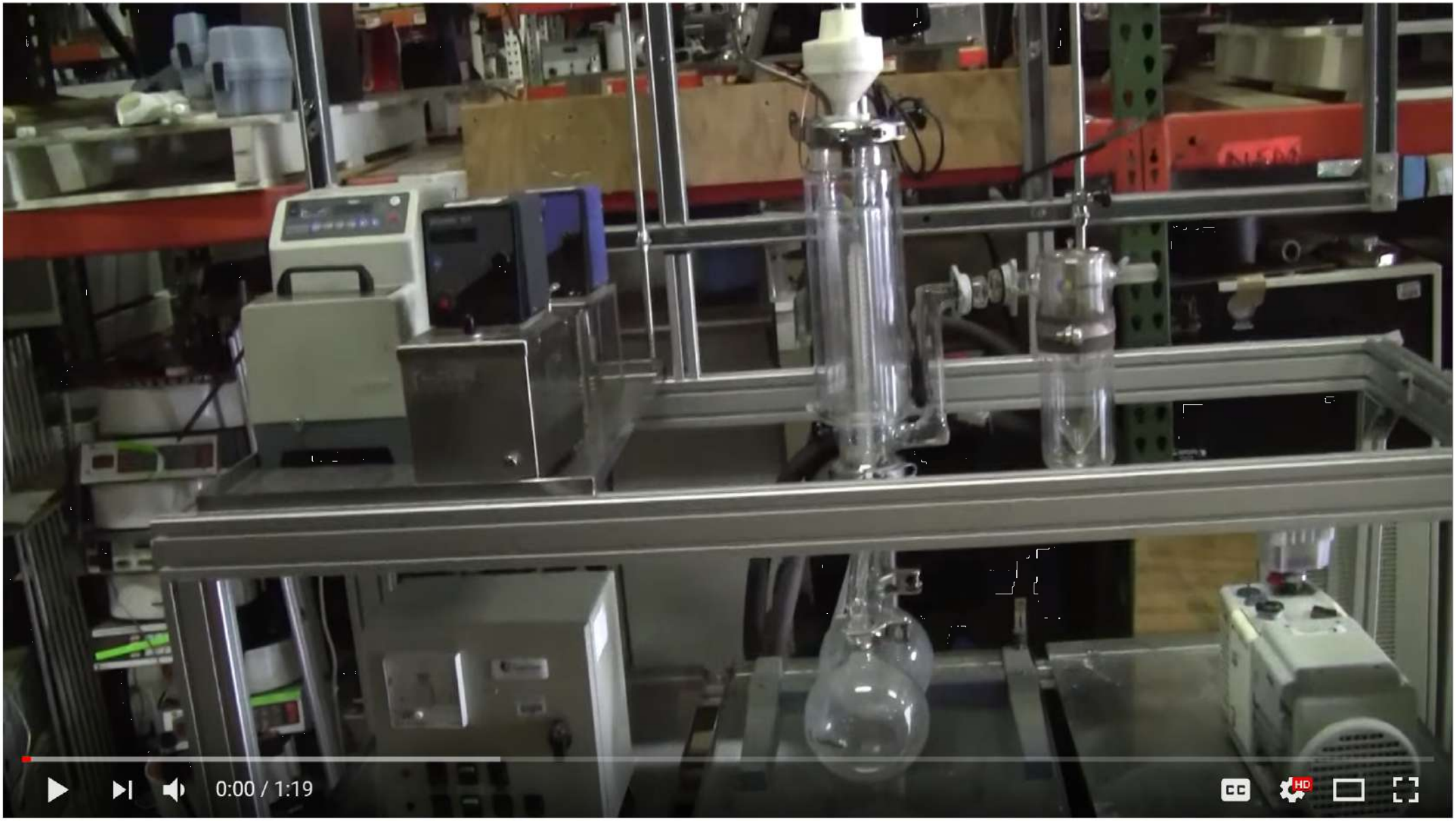


#Thinfilmevaporators #WipeEvaporatorsforsale #UsedEvaporatorsforsale

Thin Film Wipe Film Short Path Distillation much like a POPE unit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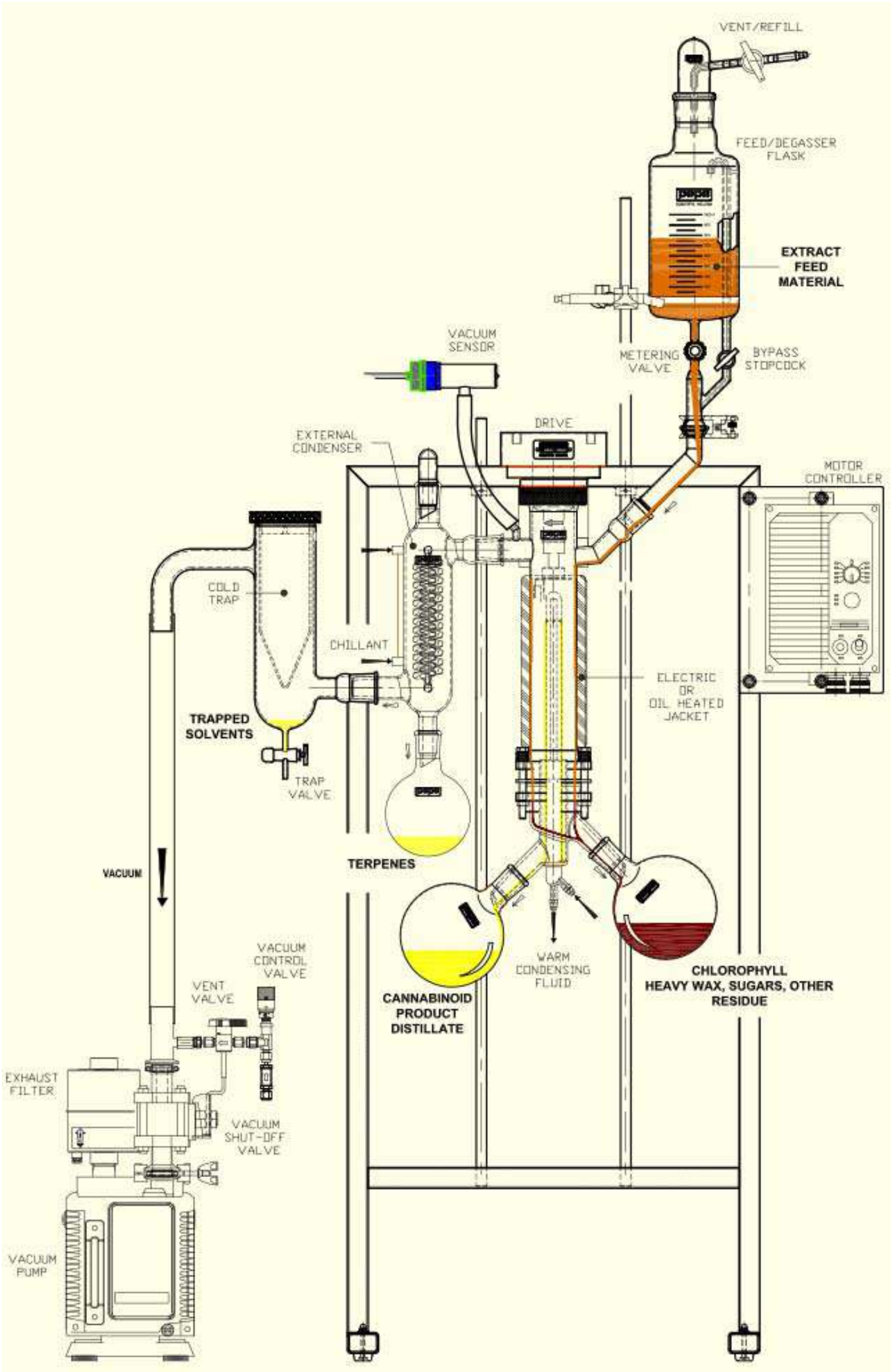
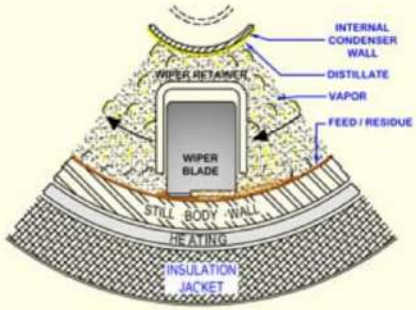

VENT/REFILL
FEED/DEGASSER FLASK
EXTRACT FEED MATERIAL
VACUUM SENSOR
METERING VALVE
BYPASS STOPCOCK
DRIVE
EXTERNAL CONDENSER
MOTOR CONTROLLER
COLD TRAP
CHILLANT
ELECTRIC OR OIL HEATED JACKET
TRAPPED SOLVENTS
TRAP VALVE
TERPENES
VACUUM
VACUUM CONTROL VALVE
VENT VALVE
WARM CONDENSING FLUID
CANNABINOID PRODUCT DISTILLATE
CHLOROPHYLL HEAVY WAX, SUGARS, OTHER RESIDUE
EXHAUST FILTER
VACUUM SHUT-OFF VALVE
VACUUM PUMP

Feed material is delivered from a feed flask into a cylindrical evaporation section, having heating, on the outside, (either electric resistance or circulating hot fluid jacket type), and a diagonally slotted wiper mechanism forcing liquid around and downward in a thin film on the inside. In the center of the body is a closely positioned internal condenser, providing a short path for vapor molecules traveling from the heated surface to the condenser surface. For cannabinoids, the internal condenser fluid must be kept elevated (~70°C) to prevent high viscosity or freeze up of THC, CBD and related components. During the journey downward, lighter (lower boiling point) fractions of the liquid begin to vaporize, move to the internal condenser and condense, falling down as a liquid into a well that captures and separates the distilled liquid (cannabinoid) which flows into a receiver flask. Heavier residue material (Chlorophyll, salts, sugars, heavy wax fractions) does not evaporate and instead travels the length of the still body and flows into a different receiver flask. Because of the optimized Pope design, this all happens within a number of seconds, and under vacuum-lowered temperatures, thus minimizing any possibility of product degradation.

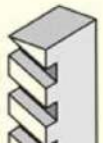
While Cannabinoids are caught and collected by the internal condenser, a different, external condenser, maintained at a chilled temperature, can capture terpenes (which are lighter than cannabinoids). The isolated terpenes are then collected in another, separate receiver flask. Depending on the composition of the feed material and the goals of the operator, some quantities of different terpenes are obtainable which can be very useful for various product formulations. Any remaining vapors which escape both the internal and external condensers and which may contain small amounts of solvents, water or lighter terpene components, are collected in a cold trap maintained at an ultra-low temperature. The trap serves the purpose of maintaining lowered vacuum levels in the still system and protecting the vacuum pump from contamination from the light vapors.

It is important to maintain a steady feed rate, body temperature and vacuum level. In the standard glass molecular still systems, feed rate and vacuum are maintained manually. Pope also offers positive displacement feed pumps, automatic flow rate controllers, automatic vacuum controllers and other advanced features including product discharge pumps, multiple in-series staged still unit skid mounted systems and computer/PLC control. As clients' product production requirements increase, Pope can assist with technology consistent throughout the product line, allowing straightforward process equipment scale up. Equipment for processing 24/7 at more than 200 kg/hr is offered, well more than sufficient for any cannabinoid application!



Thin films are created in Pope Wiped-Film Stills for a variety of reasons:

1. Turbulence and micromixing created by a rapidly moving diagonally slotted blade greatly assists in heat transmission, thereby lowering the temperature required on the inside evaporator wall for a given system pressure.
2. A maximum resulting surface area per unit volume of flow is generated, facilitating rapid, efficient evaporation.
3. The liquid exposure time to the elevated wall temperature can be controlled and also completed within a matter of seconds. This minimizes product degradation of heat sensitive materials by controlling the wiper assembly speed.
4. Pope diagonally slotted wiper blades promote plug flow with little back mixing and direct motion both circumferentially and downward. This minimizes dwell time distribution, ensuring that material flowing through the system has a uniform exposure to process conditions.

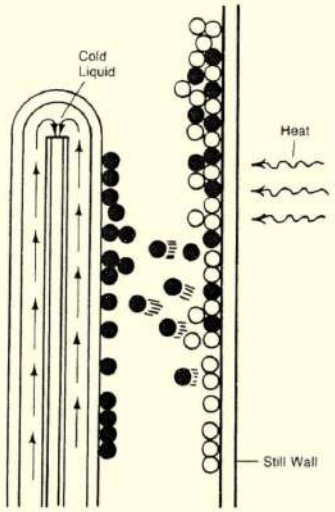


The Molecular Background

Wiped-Film still technology takes advantage of the fact that each chemical substance has a characteristic vapor pressure. It is this relative difference in vapor pressures which dictates how easily a complex compound can be separated into its constituent components.

Since the molecules of all matter are in constant motion in varying degrees, depending upon the chemical composition of that matter and the temperature and pressure applied to it, molecules near the surface have a tendency to escape into the surrounding atmosphere. As temperature increases and pressure decreases, this escaping tendency usually increases and the substance is said to vaporize.

The force generated by these escaping molecules is referred to as the vapor pressure of that material at a particular temperature and pressure. It is the relative difference in vapor pressure of substances which dictates how easily a complex compound can be separated into its constituent compounds.



Basic evaporation and condensation

2 in Cannastill

4 in Cannastill w/3 Pump Option

2X6 in Turnkey PLC Cannastill

Extraction of DMT from *Mimosa hostilis*

Video & PDF version

The DMT Workshop

This 1280x720 MP4 video can be played with Windows Media Player 12 (not available for Windows XP), QuickTime or with almost any Linux distro on a live CD or USB stick. Also available in various MP4 (Apple), WMV (Windows) and 3GP (mobile) resolutions. The video is free of charge although you are welcome to make a Bitcoin donation to 172GoBNE9LMkogRxmE2TKi6JwpFPFTY4et

Introduction

Mimosa hostilis root bark (MHRB) is widely available in powdered form and contains up to 1% DMT. The powdered root bark is usually boiled and taken after a harmine or harmaline containing plant such as *Banisteriopsis caapi* or *Peganum harmala*. Harmine and harmaline are monoamine oxidase inhibitors which make the DMT active orally and are quite nauseating. Boiled root bark is also very nauseating so these combinations don't usually make for an enjoyable evening. Another option is moclobemide, a more powerful pharmaceutical MAOI, which can be taken with extracted DMT (ideally as DMT fumarate) to avoid these problems. Warning: using moclobemide with MDMA (Ecstasy) can be lethal.

Theory

Traditionally an acid-base extraction is used. The root bark is powdered and acidified to around pH 3, usually with HCl. The liquid is filtered off or decanted and the process repeated three times. The collected liquid is then basified to around pH 10 with NaOH and extracted with a non-polar solvent, usually at least three times - shaken, not stirred! The DMT freebase is highly soluble in the non-polar but virtually insoluble in the aqueous phase, so the non-polar is separated off and evaporated to give a crude extract. This extract can be purified for smoking, although smoking or snorting DMT is not recommended as it is very irritating to the mucous membranes, due to its alkalinity. (Heptane can be used for crystallisation and is available in the US as Bestine, a rubber cement thinner). The crude extract is quite adequate for oral use however, or for the preparation of DMT fumarate, so the crystallisation stage is omitted here. (Heptane is less suitable for initial extraction from basified MHRB as it gives only two-thirds the yield of naphtha.) In practice the acidification stage can be omitted and it can be basified to far beyond pH 10, which helps to get a good partition without any emulsion, and saves using a pH meter. DMT is highly soluble in warm naphtha (up to 50 °C - DMT boils at 67-68 °C) but barely soluble below zero, so the naphtha can be recycled and the precipitate dried rapidly. (Recycling solvents is advisable as some DMT will remain in solution below zero.) The crystals below are produced by evaporation. Freezing naphtha yields a powder (in weighing boat below) which is less sticky and a paler yellow than the crystals, but probably of higher purity and considerably quicker and cheaper to produce.

Chemicals and Equipment

Deionised Water (from any car accessory shop)
Sodium Hydroxide (Caustic Soda - for unblocking drains from DIY stores)
Naphtha (petrol lighter fluid)

Safety goggles and rubber gloves
Glass bottle with plastic screw cap
McCartney bottle or similar
Funnel
Pipette
Three-valve pipette filler (optional)
Poultry baster
Rectangular Pyrex dish
Single edge razor blade
Scalpel

MHRB powder

Chemicals

Equipment

Method

SAFETY GOGGLES AND RUBBER GLOVES MUST BE WORN AT ALL TIMES WHEN HANDLING CAUSTIC SODA

1. Add 200 ml deionised water to the screw cap bottle. Then add 5 g of caustic soda while wearing protective goggles and gloves. Allow enough space

1. Add 200 ml deionised water to the screw cap bottle. Then add 5 g of caustic soda while wearing protective goggles and gloves. Allow enough space for shaking - the bottle shown is a pint vinegar bottle (568 ml). The caustic soda will need shaking to dissolve, or the bottle base will become very hot. Once dissolved add 20 g *Mimosa hostilis* root bark powder - a large bore funnel is useful. (Buy powdered root bark as the wooden stuff is likely to destroy your coffee grinder!) Wear a dust mask when handling the powder as it goes everywhere. Shake the bottle and leave the basified root bark overnight. To speed things up the sealed bottle can be placed in a saucepan of warm water up to 60 ºC for an hour - plastic bottles are not recommended as they often develop cracks when heated.

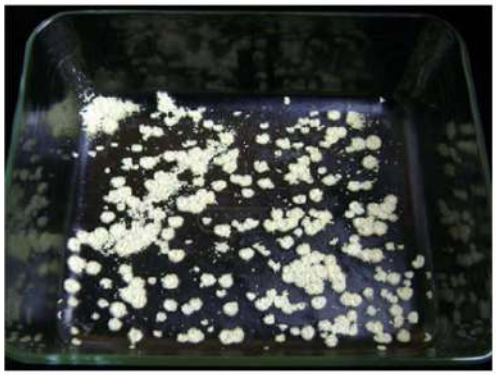
2. Add 50 ml naphtha (35 g), recap the bottle and warm in a water bath to 60 ºC. Loosen and retighten the cap to release any pressure - if the thread is weak a plastic wine cork should fit well, but ensure that it is held firmly during agitation. Remember that naphtha fumes are flammable. (If necessary wrap PTFE plumbing tape around the cork to get a tight fit.) The bottle must now be shaken vigorously for at least a minute while wearing protective goggles and gloves - the DMT shuffle! Leave the bottle to rest in the water bath at 60 ºC after shaking. After a few hours there should be a clear partition between the caustic soda solution and the naphtha floating on top. Allow the bottle to cool, remove the cap or cork slowly and use a pipette to remove all the naphtha - you may need to tilt the bottle and use a long pipette - wear protective goggles and gloves in case of spillage and remember that naphtha is highly flammable. The poultry baster and long pipette fit together with plastic tubing (shown on the baster) so it can be inserted into the screw cap bottle. (The ¼" tubing fits over the end of the baster and inside the open end of the long pipette.) Alternatively a three-valve pipette filler can be fitted to a long pipette. These clever devices have pinch valves for Air, Suction and Empty and can be purchased cheaply on eBay. A McCartney bottle is useful to help separate the phases as this is impossible in a wide vessel. Use a pipette to remove all the naphtha from the McCartney bottle and empty it into a rectangular Pyrex dish. Place the Pyrex dish in a freezer for a few hours.

3. Remove the Pyrex dish from the freezer. Tilt it so that the naphtha can be removed from a corner with a pipette and place it in the screw cap bottle, making up the volume with fresh naphtha if necessary. (Pouring the naphtha from the Pyrex dish will remove crystals.) Invert the dish to keep dust out and leave at room temperature until all the remaining naphtha has evaporated. You should be left with deposits of tiny crystals which can be scraped up with a single edge razor blade. The crystals can be scraped off the razor with a scalpel into a Rizla paper - keep the scalpel blade in a wine cork when not in use. Repeat the process until no more precipitate appears - remember to loosen and retighten the bottle cap to release any pressure before shaking. To save elbow grease a laboratory shaker can be used for the agitation - for best results it needs to be run at full throttle and on the floor for safety. Vigorous agitation will create an emulsion which can take a few hours to resolve in a warm water bath, but gives a much greater yield than gentle agitation. If emulsion remains in the naphtha, the phases should separate in a McCartney bottle. If smaller or larger quantities of caustic soda are used the emulsion will not clear as well - the ratio of 5 g caustic soda : 200 ml deionised water : 20 g MHRB powder gives optimum results.

4. To purify the extract, add to naphtha in a sealed jar or McCartney bottle. Place on a hotplate stirrer until warm and thoroughly stirred. Once dissolved, decant off the naphtha from any crud with a pipette and freeze precipitate as before. This will give a fine yellow powder shown in the weighing boat below. Freebase DMT should be stored in an airtight container in a freezer.

Partition

Crystals formed by evaporating naphtha



Powder precipitated by freezing naphtha

Freebase DMT

Bulk Extraction Methods

In the bulk extraction below, 12 g caustic soda is added to 360 ml deionised water in four 750 ml olive oil bottles and shaken thoroughly. 62 g MHRB is then added to each bottle, shaken thoroughly and left overnight. 62 ml naphtha is then added and after warming on the hotplate, each bottle is secured to the shaker using stick-on Velcro (from haberdasheries) and bungee straps. Each bottle is agitated for one minute at full power and returned to the hotplate until the emulsion resolves. If emulsion remains in the naphtha, the phases should separate in a McCartney bottle. Three extractions are usually required. Both hotplate and shaker are operated at ground level for safety.

Olive Oil Bottles on Hotplate

Olive Oil Bottle on Shaker

SAFETY GOGGLES MUST BE WARN AT ALL TIMES WHEN SHAKING OR POURING CAUSTIC SODA SOLUTIONS

In the bulk extraction below, 67 g caustic soda is added to 2 litres deionised water in a 5 litre tin and shaken thoroughly. 333 g MHRB is then added, shaken thoroughly and left overnight. 250 ml naphtha is then added and the tin heated to 50 °C in a water bath. The tin in then shaken by hand for one minute, stopping when necessary to release any pressure. (The plastic locking teeth on the pouring spout are cut off to prevent the cap seizing on!) The contents are then poured into a narrow neck 2 litre erlenmeyer flask and kept warm whilst being magnetically stirred with a large stir bar. (The stir bar is gently inserted and removed by using a magnet on the outside of the flask - shown on the hotplate stirrer below. It is also handy if the stir bar needs to be centred in the flask.) Gentle stirring should help resolve any emulsion and gives a much cleaner product. (The hotplate stirrer can be plugged into a power meter to adjust the heat accurately.) After several hours the phases can be separated using a three-valve pipette filler with a long pipette. A McCartney bottle is useful to help separate the phases at the bottom of the naphtha layer.

The flask below is sealed using cling film with an elastic band, although polyethylene based DuraSeal would be more durable (paraffin based Parafilm M does not resist solvents). Film is more convenient than a rubber bung as the aperture can be almost covered when drawing off the naphtha, reducing evaporation. Three extractions are usually required. The final extraction may be waxy and can be improved by magnetically stirring on a hotplate in a small sealed jar with naphtha, then separating and freeze precipitating as before. Heptane is more selective and will leave any brown gum in the bottom of the jar, although more care is required as it attacks any rubber seals and pipette bulbs!

High density polyethylene (HDPE) containers are not suitable for bulk extractions as the naphtha dissolves some of the material making the extract sticky, particularly when heated in a water bath (which is necessary to achieve a good yield). A demijohn could be used instead of the tin below, provided that the bung is removed regularly when heating and shaking, to release any pressure. An alternative extraction method is to use an Erlenmeyer flask on a hotplate stirrer alone, but this produces a far lower yield than is obtained by shaking beforehand.

Water Bath

Erlenmeyer Flask on Hotplate Stirrer

Separation of Phases

Preparation of DMT fumarate

DMT fumarate is preferred for oral use after an MAOI as it is water soluble and causes less gastrointestinal disturbance, and can be stored indefinitely without refrigeration.

Add 1 g freebase DMT from the above extraction to 50 ml anhydrous acetone in a jar and place on a hotplate stirrer until warm and thoroughly stirred - use cling film to seal as acetone removes enamel from lids! Keep the first jar warm on the hotplate and add 310 mg fumaric acid to 50 ml anhydrous acetone in a second jar and place on the hotplate stirrer until warm and thoroughly stirred. Once both have dissolved, mix together and place on a hotplate stirrer until warm and thoroughly stirred. Swirl the jar and pour quickly into a rectangular Pyrex dish, replace cover and place in a freezer. (If necessary add more acetone and repeat to remove any residue in the jar.) After a few hours, decant off the acetone with a poultry baster and dry thoroughly on a hotplate. This will give an off-white crystalline powder which can be scraped up with a single edge razor blade. (Mixing all the ingredients together at once is effective but gives the product a yellow lumpy appearance.) The yield should be around 1200 mg, suggesting that the freebase could be 90% pure (1200 x 76%). The beauty of this method is that any excess fumaric acid dissolved in the acetone does not precipitate out when frozen!

Discard the used acetone by pouring onto concrete or tarmac, away from children or animals (it will evaporate very quickly). In this experiment the acetone was dried with anhydrous magnesium sulphate - produced by baking Epsom Salts in an oven above 200 °C. This produces a white cake which is powdered with a mortar and pestle. It is then magnetically stirred in a sealed bottle of acetone - a pint vinegar bottle is ideal. The acetone is then filtered off into a second pint vinegar bottle. Magnesium sulphate is a convenient drying agent to use as its appearance changes as it absorbs moisture. Drierite desiccant ($CaSO_4$) impregnated with cobalt chloride indicator is no longer recommended due to toxicity concerns with cobalt.

DMT is $C_{12}H_{16}N_2$ = 188 g/mol, mp 40–59 °C

DMT is $C_{12}H_{16}N_2$ = 188 g/mol, mp 40–59 °C
Fumaric acid is $C_4H_4O_4$ = 116 g/mol, mp 287 °C
(H=1, C=12, N=14, O=16)
DMT fumarate = 2 x 188 + 116 = 492 g/mol, mp 152 °C (contains 76% DMT)
Acetone Boiling Pt. 56 °C, Density 0.791, Flash Pt.-18°C, Drying agents K_2CO_3; Molecular sieve 0.3 nm; $CaCl_2$

Dried DMT fumarate

DMT fumarate

Using DMT Orally

The usual caveats apply with any psychedelic about being in a safe environment and having someone with you, particularly if you are inexperienced. Particular caution is needed here with the use of MAOIs (such as *Peganum harmala* or *Banisteriopsis caapi*) which may be dangerous when combined with certain foods or medicines containing tyramine or other naturally occurring amines, which can cause a severe rise in blood pressure. Fasting is recommended but do avoid cheese, pickled herring, broad bean pods, yeast extract, chianti wine, and phenylalanine supplements. There have been fatalities resulting from combining MAOI antidepressants with serotonin reuptake inhibitors and with MDMA (Ecstasy) - see Serotonin syndrome. Antidepressant MAOIs remain in the body for 2 weeks after use, except moclobemide which is eliminated within 2 days, while harmine and harmaline are eliminated within hours. SSRIs also remain in the body for some time, in particular fluoxetine (Prozac) which should be stopped at least 5 weeks before using any MAOI.

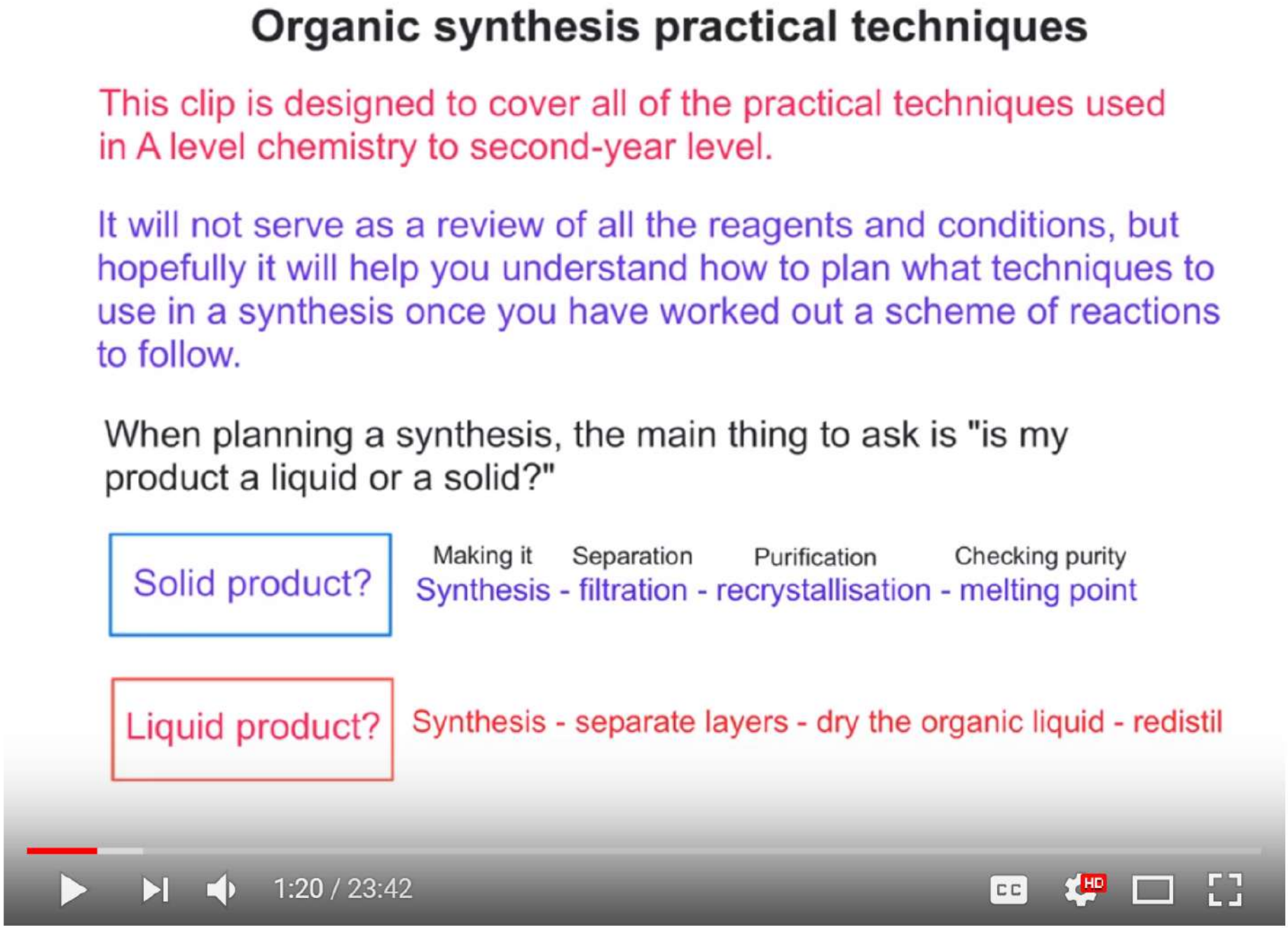
Dosing a half hour before with caapi is recommended. Simmer 20 g of shredded caapi in tap water for half an hour, strain off and repeat once. The cooled liquid is best drunk slowly. DMT fumarate can be taken dissolved in water, or in an enteric coated capsule to avoid the unpleasant taste and stomach irritation - taking with milk also reduces stomach irritation. Best to start with around 50 mg. Effects begin about twenty minutes later and last 4-5 hours. My personal preference is for moclobemide (150 mg) after a light meal, followed by an enteric coated capsule of DMT fumarate (150 mg) 50 minutes later. This combination should only cause mild nausea, although "moclo" tends to cause insomnia and is considerably more powerful than harmine or harmaline. Lying down will help to reduce nausea. Warning: using moclobemide with MDMA (Ecstasy) can be lethal (There is also evidence that combining 5-MeO-DMT with MAOIs can be dangerous - see 5-MeO-DMT Health Issues) If used outdoors it's useful to carry a plastic water bottle as thirst can be a problem. If sleep is difficult the sedating antihistamine cyproheptadine (Periactin), or diphenhydramine (Nytol, Paxidorm) can give a pleasant comedown, without the hangover of benzodiazepines. Zaleplon, Zolpidem and Zopiclone are more powerful sleeping tablets, but can be habit-forming if used regularly. (Diphenhydramine is available from pharmacies and z-drugs can be procured online, with the bonus of endless unsolicited email for potions to perk up your sex life!)

If preferred, harmine, harmaline and tetrahyroharmine (THH) can be obtained in purified form from FlowingVisions. Harmine and harmaline are supplied as freebase and will dissolve in citric acid solution, while tetrahyroharmine is supplied as HCl salt which is soluble. 100mg of harmaline, 150mg or harmine or 200mg of THH is sufficient to potentiate DMT (allow at least a half hour before dosing). All three cause mild sedation and some gastrointestinal disturbance, although they are certainly preferable to caapi or harmala.

With regard to my experience of health effects, I would say without doubt that harmine, harmaline and tetrahyroharmine have some adverse effect on immunity, as do caapi and harmala. I find moclobemide taken alone to be neutral, while the combination of moclobemide and DMT fumarate most definitely has immune stimulating properties - it certainly assists in recovery from infections, although it can also be tiring (see www.asthma.20m.com).

In case of adverse effects, have drinking water handy in a plastic cup or bottle. Absolutely no glass. Caffeinated drinks should be avoided as should alcohol, cannabis or any other drugs. Psychotic symptoms can be overwhelming but should improve over time if the person is kept calm, ideally with the minimum of illumination. In this event any future experimentation should be undertaken at a reduced dose.

DMT and the Law



Organic synthesis practical techniques

2:38 / 23:42

Solid product filtration

As organic solids are formed as impure substances due to incomplete reaction, they must be filtered impure and purified later. A **Buchner funnel** is normally used so filter action can be accelerated under **reduced pressure.**

Further purification of the solid: recrystallisation

There are various techniques for achieving this (check your exam board's specification/ textbook for which ones you need to know)

Dissolve the impure solid in a minimum amount of hot solvent.

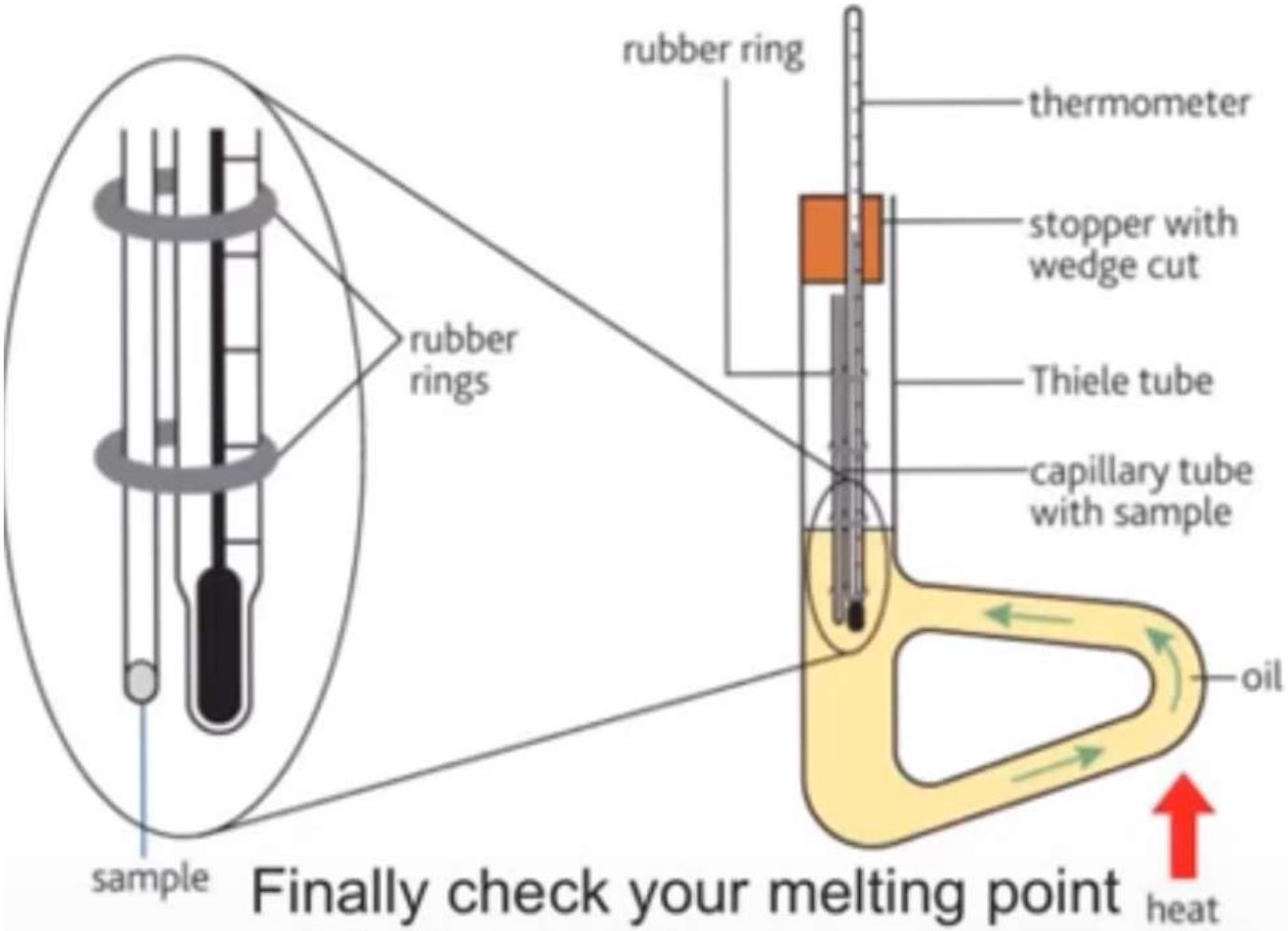
Impurities and desired product will have different solubilities in the same solvent

Checking the purity of the solid: melting point

Pure organic solids have a very sharply defined melting point range. The presence of impurities ***lowers*** this because the London forces in the simple covalent lattice will be disrupted by the presence of molecules of another substance (the impurity). Therefore there will be less of them so less energy will be needed to overcome those that remain.

A small sample of solid will be placed in a capillary tube section with one end previously sealed in the roaring flame of a Bunsen burner.

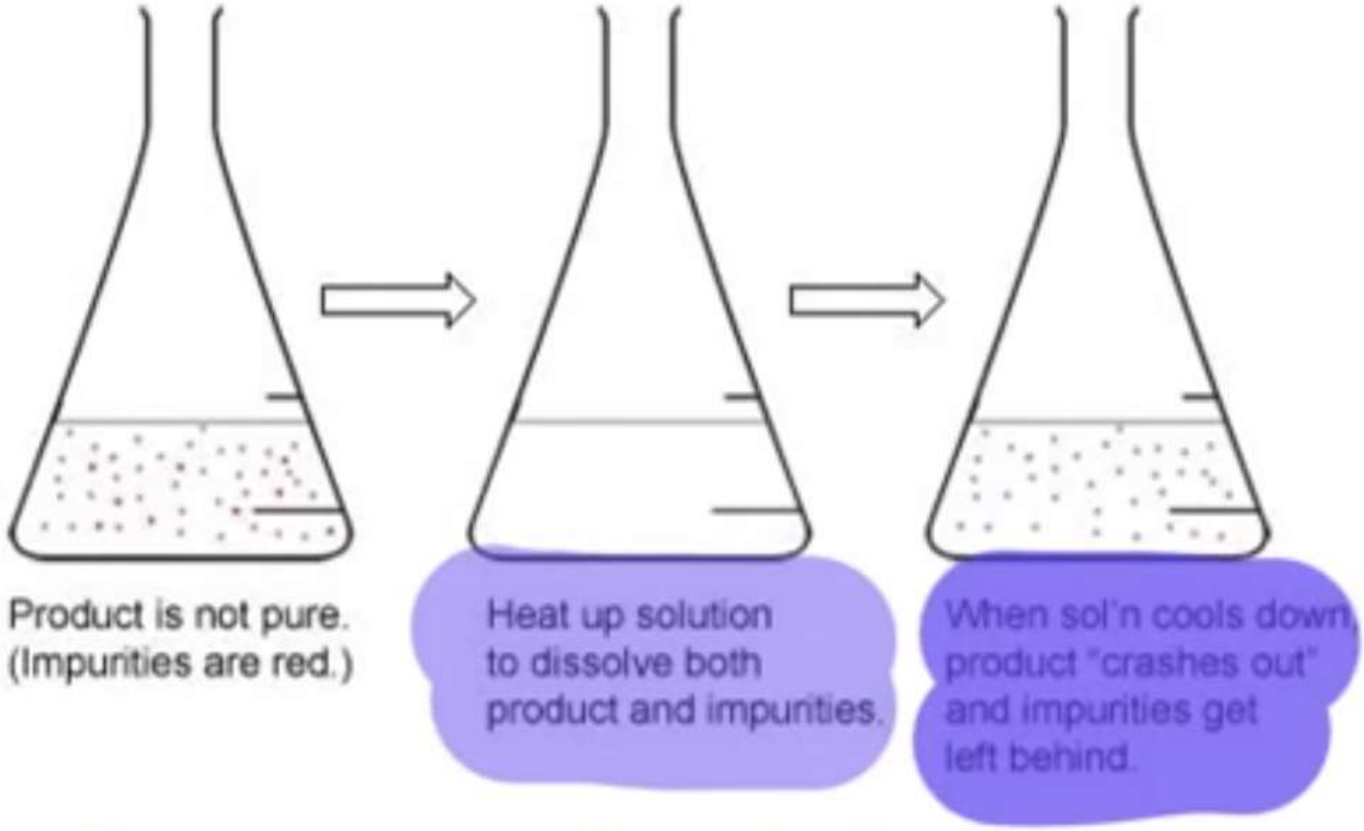
The eyepiece of the melting point apparatus contains a lens which magnifies what the viewer sees.
At the same time a heating element is switched on, and the capillary tube rested against the metal rack



Finally check your melting point against a **database**

The **Thiele tube** is similar but this time heated oil is used. So even in a power cut you can get the candles out and carry on! (Not really that would be unsafe..!)

Recrystallization in a nutshell:

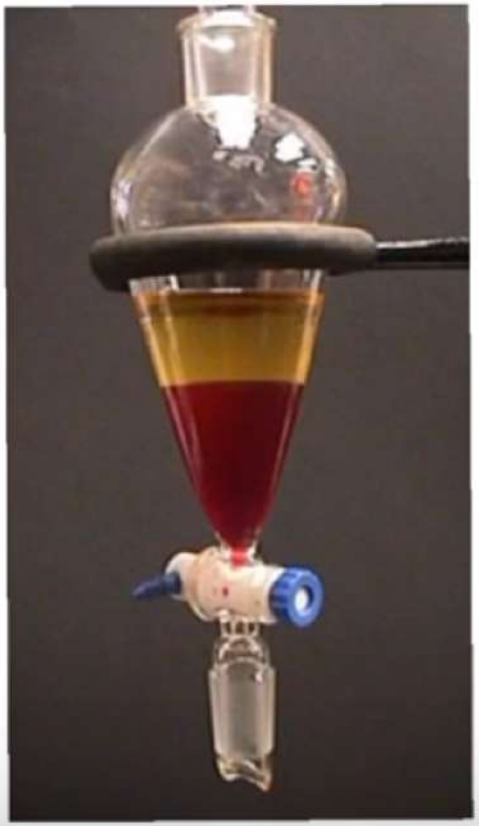


Another filtration technique is "hot filtration" where the hot solution is filtered to remove any undissolved impure solid. This may reduce yield but improve purity

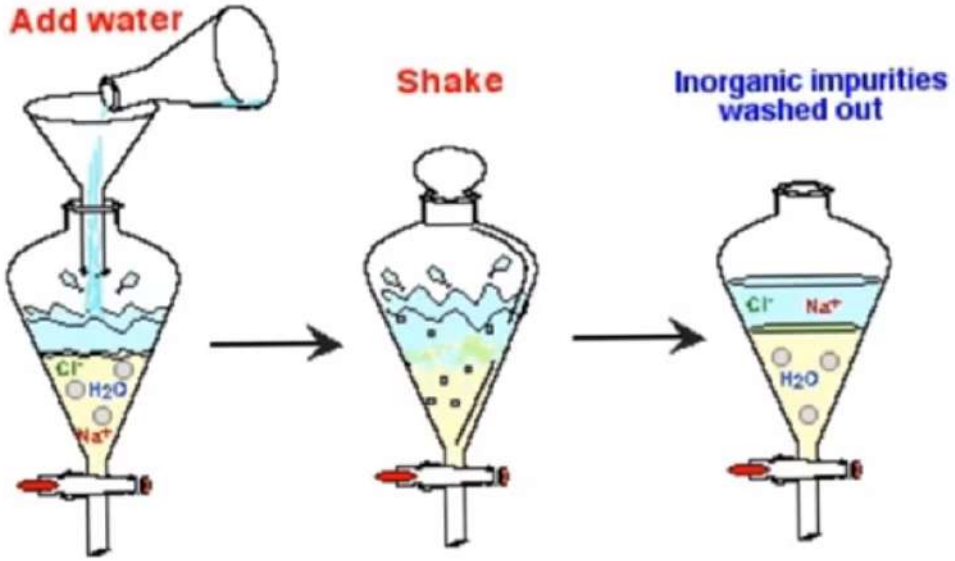
ill have different solubilities in the same solvent

Separating your liquid mixture

You've just synthesised an organic liquid. However it is also likely that at some stage in the synthetic route you've used **aqueous** reagents, so these need to be got rid of.



Two layers, aqueous and organic. Which way round they are depends on the organic liquid's **density**



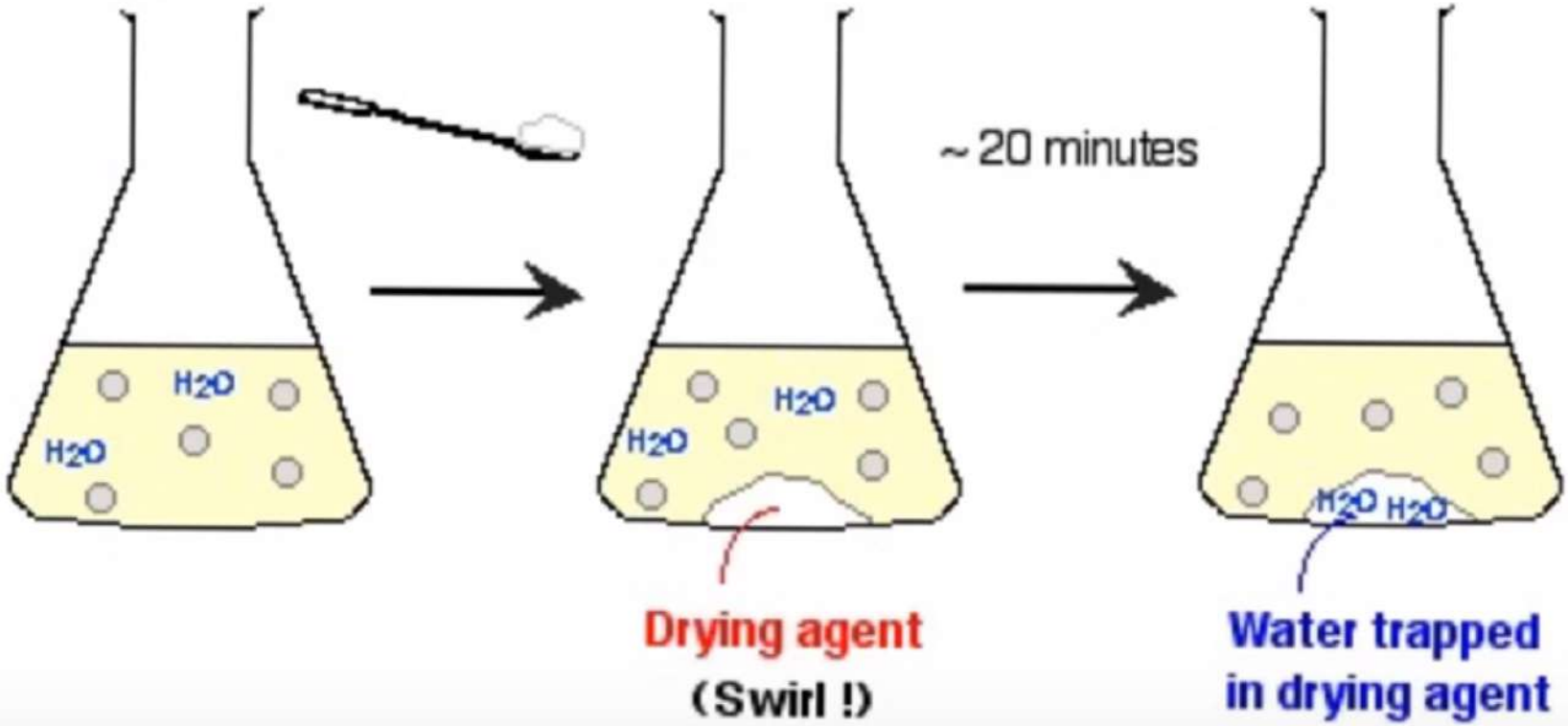
We often **wash** the mixture to get rid of unused aqueous reagents or impurities from earlier in the synthetic process.

Venting allows the mixture to release gases from the shaking

The density of water is 1.00g/cm^3

Cyclohexene has a density of 0.81g/cm^3

A drying agent such as an anhydrous salt will have a natural affinity for water



Good examples of drying agents would be anhydrous Group 1 and 2 chlorides and sulfates

Further purification of the liquid

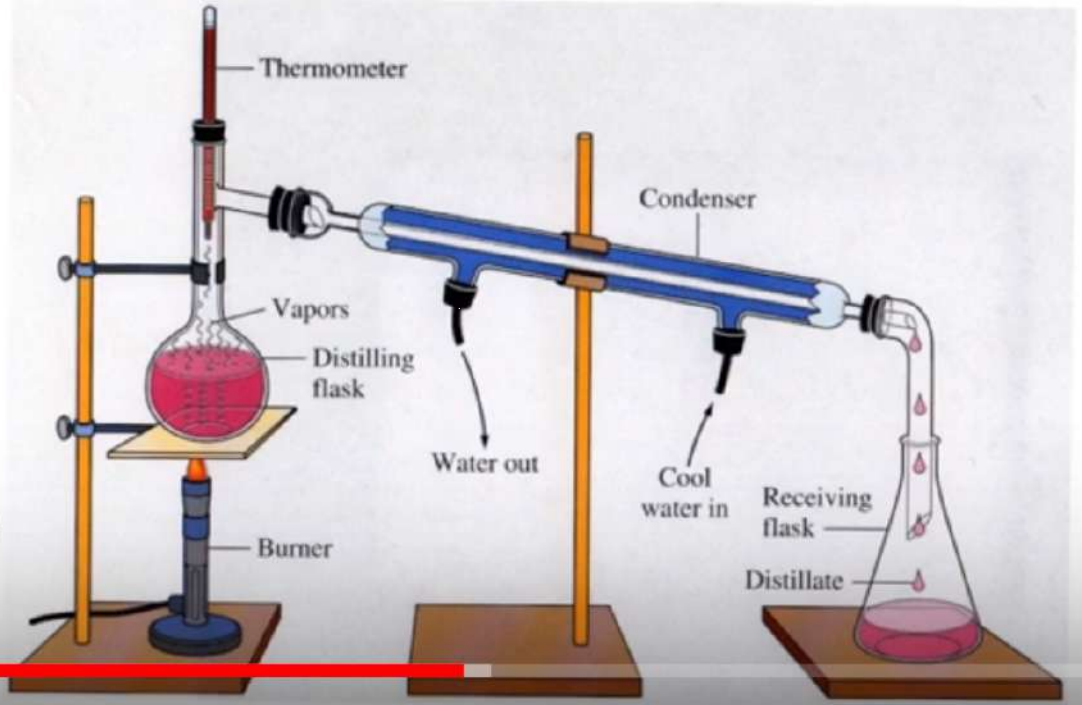
Now we're about 15 minutes into the clip, you may wish to pause and make some flashcards to use with the questions that follow.

At this point we have **dried** the liquid chemically, and if acids were used in the synthetic process, we could add a solid carbonate to react with them prior to drying.

This would produce fizzing as carbon dioxide gas is made, and when the fizzing dies down, the acid is reacted. Now the mixture can be filtered and re-distilled

Distillation will separate the desired product at its given boiling point, using a reflux condenser set horizontally at a slight angle.

If distillation was part of the earlier synthesis process, then this second distillation would be called **re distillation**



PREPARATIVE TECHNIQUES I (Preparation of 1-bromobutane)

Do not write in margin

In an experiment to prepare 1-bromobutane, 10 g of sodium bromide, 10 cm^3 of water and 6.0 g of butan-1-ol were placed in a round-bottomed flask fitted with a reflux condenser. 18 g of concentrated sulphuric acid were then slowly added over a period of 10 minutes, with the flask standing in a cold water bath, after which the mixture was gently boiled under the reflux condenser for 45 minutes. The apparatus was cooled and rearranged for distillation with the condenser in a sloping position. Distillation was carried out until no more oily droplets were collected.

The distillate comprised two liquid layers which were separated in a separating funnel. The upper aqueous layer was discarded and the lower organic one was returned to the separating funnel, where it was shaken with 10 cm^3 of concentrated hydrochloric acid. After separation, the lower layer was again returned to the funnel, where it was shaken with aqueous sodium hydrogencarbonate.

The organic layer was then run into a small conical flask and allowed to stand over anhydrous sodium sulphate until it became clear. Finally, the 1-bromobutane was decanted from the sodium sulphate into a small distillation flask and purified by distillation. Liquid boiling between 101 and 103 °C was collected in a measuring cylinder.

a) (i) Why was the concentrated sulphuric acid added slowly?

Conc acids tend to react exothermically [1]

(ii) What was the point of boiling the mixture for 45 minutes?

To allow the reaction to go to completion. [1]

(iii) What was the purpose of boiling under a reflux condenser?

To avoid losing volatile products by evaporation. [1]

(iv) What compounds would you expect to obtain on distillation with a sloping condenser?

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